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SOMMARIO

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TRE TEOREMI GUIDA PER LA VALUTAZIONE E ESTIMO DI ALCUNI EFFETTI DISCENDENTI DA UNA MAGGIORE INTERNAZIONALIZZAZIONE DELL'ECONOMIA AGRICOLA ITALIANA

di
GIOVANNI DEMARIA *

Dico subito della tesi avanzata in questo scritto frutto di considerazioni tratte da una possibile maggiore internazionalizzazione dell'agricoltura italiana. Essa è fautrice di una agricoltura molto piú aperta verso l'estero, la quale garantisca però ai suoi operatori il volere sociale migliore, ossia che gli effetti economici avversi della progressiva riduzione di clientela di alcuni rami agricoli in seguito a una maggiore importazione siano compensati da una progressiva riduzione delle loro perdite finanziarie, e ciò per la durata di tempo impiegato dal capitale e dal lavoro per adeguarsi ai nuovi livelli economici internazionali.

Ovviamente, l'economia politica come scienza è una cosa umana come tutte le altre scienze. È quindi soggetta a limitazioni e anche a errori. Tanto piú questo è vero per l'economia applicata all'agricoltura la cui lunga storia di eventi oscilla tra estremi diversissimi. Anche in questo momento questa storia svolge un ruolo determinante, dato che tante agricolture nazionali diverse si affacciano in competizione non solo sul mercato europeo ma anche su quello mondiale, per tacere del fatto che queste agricolture operano in opposizione a tante attività economiche, industriali e dei servizi, tutte diverse fra loro e nei loro confronti. L'universo dell'agricoltura italiana è perciò, di fatto, una matrice con tantissimi parametri, costellati da probabili errori logici quasi tutti ancora da determinare.

Se richiamo l'attenzione del lettore su quanto sopra è per avvertirlo che quanto esporrò può essere soggetto a tanti punti diversi di osservazione e si può perciò agevolmente pervenire a conclusioni radicalmente diverse, se non

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* Accademia Nazionale dei Lincei.

Questo studio compare come Postfazione alla 5ª edizione del libro di G. Cormegna, *Principi di estimo,* Padova, Cedam, 1991.

opposte. In questa situazione piuttosto intricata del problema dell'avvenire migliore dell'agricoltura italiana suppongo che non vi sia piú antieuropeismo, né rinuncia alla sovranità nazionale di nessuna sorta, né anticapitalismo spinto all'estremo limite del cinismo mercantile.

Il contrasto internazionale. – Finora per l'Italia c'è stata per l'agricoltura una politica protezionistica molto avanzata, oltre a quella CEE e a quella bilaterale a base di clausola della nazione piú favorita con i singoli stati esteri, specie i paesi transatlantici. Ma ora gli Stati Uniti pretendono, forti del loro attuale potenziale politico-militare, una riduzione del 90 per cento dei sussidi esistenti in favore delle esportazioni e delle produzioni agricole della CEE, pena in caso di non accettazione la (dichiarata) minaccia di imporre dazi punitivi su alcune importazioni americane, specialmente quelle dei prodotti tessili. In particolare ciò avverrebbe per via della diminuzione delle esportazioni americane verso la Spagna e il Portogallo prima che questi paesi aderissero alla CEE delle dodici nazioni. Questa presa di posizione degli Stati Uniti avviene nonostante il fatto che i loro agricoltori riceveranno nei prossimi 5 anni sussidi federali dell'ordine di 40 miliardi di dollari per cui una percentuale sostanziosa del reddito agricolo dipenderà da questa spesa pubblica. Oltre a ciò, gli Stati Uniti non intendono in alcun modo liberalizzare il commercio internazionale dei settori della navigazione, delle telecomunicazioni e dei trasporti aerei. Perciò essi sono in parte in contrasto con la loro professata posizione di libero scambisti per tutto il mondo. In questo modo gli Stati Uniti respingono l'offerta fatta dalla CEE di una riduzione del 30 per cento per 10 anni (a partire dal 1986) degli attuali sussidi agricoli. Questa offerta viene ritenuta nemmeno una base accettabile per i relativi negoziati [1].

Gli effetti economico-sociali dell'attuale regime. – Di fronte a questi eventi, alcuni certi altri con alta probabilità di avverarsi, come si troverebbe l'economia agricola italiana?

Una prima constatazione è di regola. Le condizioni dell'agricoltura italiana non sono quelle dei paesi avanzati dove gli agricoltori sono relativamente pochi e in genere l'agricoltura è particolarmente privilegiata anche perché stimolata dalle domande provenienti da libere esportazioni. Essa, invece, è soggetta a un generale garantismo sia tradizionale che per opera della CEE.

Infatti, anzitutto, gode da tempo di speciali vantaggi, quali la diminuzione dei prezzi del carburante agricolo e i finanziamenti di favore, oltre, beninteso, la protezione doganale e i prezzi garantiti e i sussidi della Comunità europea. Però ciò non trattiene dalla presenza di un fenomeno in corso di svolgimento. Si dà in pratica, oltre a un marcato spreco degli aiuti all'agricoltura, un sistema

[1] In particolare la CEE vorrebbe prezzi garantiti per i cereali, il latte, il burro, i semi oleosi, gli ortaggi, la frutta, piú speciali indennizzi a chi abbandonerà parte dell'attività produttiva in modo da ridurre al minimo le attuali eccedenze comunitarie.

tale che rende nel complesso un disservizio all'agricoltura moderna in quanto ne nasce una serie di disincentivazioni economiche che trattengono parte delle risorse del paese dal volgersi verso settori piú produttivi e perciò si riducono i tassi di crescita dell'economia in generale e dello stesso settore agricolo. Inoltre, viene meno la spinta alle concentrazioni aziendali che innalzerebbero il livello di produttività attraverso un piú razionale impiego di fattori di produzione ad alta resa (basta pensare ai programmi di addestramento e di ricerca e ai beni pubblici utilizzabili solo se l'impiego è su larga scala), e anche attraverso una commercializzazione migliore dei prodotti, onde minori fondi di investimento nelle comunità agricole.

Scarsissimo in particolare è il ruolo dinamico inteso come capacità di innovazione delle piccole imprese italiane in vari rami che compongono tale settore, fatta eccezione del ramo ortofrutticolo, dell'agrumicultura e in parte della stessa viticultura. Queste piccole imprese sono i produttori marginali dell'economia agricola italiana. Purtroppo, i costi economici di questa situazione non sono stati mai misurati econometricamente nella loro interezza sia per i vari rami dell'agricoltura e sia in rapporto al totale del PIL del paese. Esistono solo stime del cosiddetto grado di monopolio riferito a singole imprese e alle "industrie". Comunque, un fatto è certo. Finora sono stati i consumatori, sia nell'industria che nell'agricoltura, a sopportare il peso del mercato non libero. La politica del benessere in contrasto con quella della piena libertà non si è fatta scrupolo di spogliarne i redditi personali per ingenti importi.

Ovviamente, cosí si producono notevoli distorsioni artificiali nei prezzi e nella struttura produttiva nazionale, e perciò l'economia agricola italiana finisce con il trovarsi in posizione di quasi monopolio sia statico che inefficiente. Dal lato dell'offerta, solo in parte i suoi prodotti dipendono dai fattori concorrenziali, sebbene per la domanda i mercati in cui essa si presenta siano quasi tutti di concorrenza. Perciò in questo tipo di equilibrio tendenzialmente di quasi monopolio o meglio con una miriade di quasi monopoli, la distribuzione del reddito agricolo è tale per cui si impiega meno fattore lavoro e si hanno rapporti di consumo, rispetto al reddito, piú bassi di quelli che si avrebbero senza le distorsioni sopra illustrate, oltre a rapporti tra capitale e lavoro in contrasto con l'impiego di metodi tecnologici piú evoluti come quelli moderni.

Teorema classico dei vantaggi del libero commercio internazionale. – La tesi teorica opposta alla situazione concreta riassunta nelle pagine precedenti è quella per cui bisogna realizzare le condizioni onde si abbia un aumento continuo della produttività agricola la quale consenta un aumento pure continuo del PIL reale.

Queste condizioni si riassumono nella piena libertà delle importazioni e delle esportazioni agricole, libertà che agisce infatti nel senso tanto di allargare il mercato e di combattere la disoccupazione quanto di rendere piú a buon mercato tutti i fattori di produzione e la loro collocazione, razionalizzando meglio l'attività produttiva e dando maggiore e piú sistematico spazio alla domanda.

Con l'internazionalizzazione dell'economia agricola dei paesi della CEE i rapporti di equilibrio generale sarebbero quelli ideali di concorrenza perfetta, che indicano quando e come la ricchezza, il reddito, il risparmio vengono prodotti al massimo dell'efficienza economica. Una generale eguaglianza dei prezzi delle risorse e dei prodotti si instaurerebbe nei vari paesi della Comunità europea, tenuto conto beninteso delle spese di trasporto in largo senso in modo da includere anche i rischi mercantili. L'obiettivo maggiore della libertà economica internazionale, oltre a una nuova e maggior ricchezza, un nuovo e maggior reddito, un nuovo e maggior risparmio, sarebbe anche una minore disoccupazione complessiva. Tale politica smantellerebbe anche per sempre le paratie legali che dividono e si oppongono attualmente a una maggiore crescita economica e in particolare verrebbero meno i legami dei partiti, specialmente la loro burocrazia populistica e i conseguenti effetti deleteri. La libera competizione internazionale porterebbe anche alla soluzione di alcuni tra i maggiori problemi agricoli odierni, quali la frammentazione della proprietà agricola, la posizione inferiore degli occupati agricoli, il peggioramento della piramide delle età in agricoltura, le montagne di prodotti agricoli invenduti o venduti solo con i sussidi comunitari, problemi che altrimenti si trascinerebbero indefinitamente nel tempo. Oltracciò, la nuova struttura economica nei paesi della CEE ridurrebbe sensibilmente il prezzo delle terre di lavoro, tranne per i loro prezzi nei distretti urbani che dipenderebbero soprattutto dallo sviluppo economico locale. Tutto ciò non escluderebbe la doverosa e legittima salvaguardia dei dazi doganali anti-dumping contro i prodotti agricoli della CEE esportati talvolta sotto costo in Italia.

Obiezioni alla teoria e alla applicazione del teorema classico della libertà internazionale nella valutazione degli effetti sull'economia agricola italiana. – Contro detta applicazione del teorema classico debbono essere tuttavia sollevate numerose eccezioni ed opposizioni, frutti del fatto che in passato si sono avute parecchie esperienze del passaggio da una economia protezionistica a una libera e anche numerose esperienze del passaggio contrario. Tali eccezioni e opposizioni sono nel senso dell'approfondimento e dell'integrazione del teorema classico in quanto si deve tenere conto sia delle economie e delle diseconomie di scala sia dei fattori esogeni, in modo da realizzare il volere sociale migliore esistente in un certo momento del tempo storico.

Intanto, con la riduzione delle protezioni e dei sussidi agricoli si creerebbero per un certo tempo nuovi problemi di disoccupazione. Nelle province colpite affiorerebbe un nuovo tipo di disoccupati per non parlare della tragica povertà della categoria, molto numerosa, dei braccianti a tempo pieno o limitato. Onde una perdita economica netta per una parte degli operatori agricoli. Ma fino a che punto questa perdita può essere tollerata senza colpire gli interessi vitali del sistema economico italiano, abbracciante sia i grandi e piccoli agricoltori e le loro proprietà sia gli interessi essenziali dei consumatori e della manovalanza

agricola costretta all'abbandono delle aziende colpite? Ciò costituisce un problema complesso.

Bisognerebbe considerare anzitutto il numero degli addetti e delle superfici agricole impiegate nelle piccole aziende. Si tratta di redditi unitari molto modesti ma molto numerosi. Ciò va detto in particolare per le aziende specializzate in seminativi e altre coltivazioni a orientamento erbivoro o poliallevamento e l'ortofloricoltura. Quelle con mano d'opera pari a una unità ammontano, a prescindere dall'età dei conduttori part- e full-time, a oltre un milione, mentre quelle con mano d'opera di due unità sono circa un terzo di meno. Ciò si desume dalla "Valutazione delle aziende agricole secondo la classificazione tipologica" dell'ISTAT per l'anno 1987.

Contro il costo economico-sociale dell'esodo degli agricoltori che abbandonerebbero la loro attività si deve però tenere presente il vantaggio conseguito con il possibile ingresso in futuro, anche nella piccola agricoltura, delle nuove tecnologie che avanzano a grandi passi in alcuni paesi. Per esempio, l'azienda agricola olandese sostituisce oggi, con l'impiego di sofisticati computer e macchinari, parte del lavoro umano onde un minimo di addetti alla mungitura, invece dell'imponente bracciantato agricolo che per secoli fu presente sulle terre. A lungo andare l'imprenditorialità agricola diventa profittevole solo se la produzione è massima e se il lavoro e gli altri fattori sono impiegati al minimo costo internazionale.

Bisognerebbe poi particolarmente considerare il maggiore vantaggio risultante dalle minori distorsioni dei fattori di produzione in agricoltura per i minori costi delle irrigazioni e della bonifica dei territori meridionali, interventi del burocratismo politico efficienti solo per via della limitazione della concorrenza delle importazioni dall'estero. Altro vantaggio considerevole è rappresentato dalla maggiore cifra d'affari per i settori agricoli che già esportano e dall'incremento dei loro valori immobiliari (che però va messo in controrelazione con il decremento dei valori immobiliari delle piccole aziende agricole colpite dalla maggiore internazionalizzazione dell'agricoltura la cui identità economica ne esce in larga parte compromessa).

Dietro questi maggiori e minori vantaggi e svantaggi prodotti dalla internazionalizzazione dell'economia agricola in taluni dei suoi rami, vantaggi e svantaggi particolari che una piú adeguata disamina potrebbe meglio argomentare e estendere, sta però il volere sociale migliore dei singoli operatori agricoli e delle masse democratiche che vogliono tutelare a tutti i costi i loro interessi del momento, salvaguardando la propria identità economica e sociale contro il tipo di civiltà che discenderebbe da un mercato generalizzato troppo libero e perciò troppo mercantile, governato inevitabilmente anche da certi fattori oligarchici. In ultima analisi molti europei desiderano una economia nazionalmente controllata anche dopo il 1992 e non vogliono sottostare completamente alle decisioni di Bruxelles.

Dalla prospettazione precedente si deve concludere che esiste una miriade di fattori economici e sociali e non solo i due dati del costo di produzione e

della intensità della domanda reciproca come nel teorema classico del libero commercio internazionale e della specializzazione delle produzioni nazionali. Bisogna perciò inserire nell'equazione generale del teorema classico, oltre i parametri che riguardano i guadagni e le perdite dovute alla internazionalizzazione dell'economia agricola e al progresso tecnologico acquisibile soprattutto con il libero mercato, tutti i vantaggi e gli svantaggi connessi alla parziale perdita di identità storica economica e sociale di cui si parla al termine del paragrafo successivo.

Questa equazione, cosí allargata, sottrae nella ricerca dell'ottimo totale dell'agricoltura ogni arbitrarietà di punti di vista e i ragionamenti capziosi perché tiene conto delle esigenze di un settore pieno di antichissima storia qual è l'agricoltura onde la necessaria protezione della natura, della sua economia e della sua paesistica.

Teorema della gradualità. – La transizione da una situazione di equilibrio economico storicamente chiuso e relativamente monopolistico a una economia agricola piú aperta richiede però un lungo periodo di tempo per la "implementation". Bisogna che le varie economie europee siano politicamente disposte non solo a trasferire a una singola autorità il potere di stabilire una nuova politica ma anche nella realtà che tutti gli agenti delle forze economiche non facciano ostacolo a essa e che quello che rimarrà sia in grado di sbaragliare in qualsiasi momento la concorrenza esterna, cioè sia sempre con tecnologie all'avanguardia, con molta istruzione professionale e con un costo a livello europeo per gli investimenti, e non dia luogo a nuove forme di produzione non economica contrarie al libero mercato.

Il secondo teorema valido per il futuro dell'economia agricola italiana riguarda quindi la necessaria gradualità nella realizzazione della politica della riduzione dei sussidi agricoli e richiede un periodo di tempo che non si misura a mesi ma ad anni in modo da dare ai movimenti interni e internazionali dei fattori di produzione e dei prodotti la possibilità di allinearsi alle successive e sempre migliori posizioni di equilibrio economico interno e internazionale sorte in seguito alla riduzione progressiva del protezionismo agricolo.

In tendenza, ci vorrà per ogni regione un esteso check-up organizzativo, in particolare una organizzazione territoriale delle piccole aziende agricole restanti per unificarne il carattere di identità e organicità onde i conseguenti approfondimenti economici dei processi produttivi e distributivi cosí come è stato fatto in parte per la rete extraurbana e urbana delle autolinee e in parte si sta già facendo, per esempio, nel settore agrumario.

Nell'Italia agricola futura non dovrebbe essere valida la preoccupazione di conservare una certa base di sicurezza alimentare, come in passato e come oggi per i paesi in cui vi è il costante pericolo di grosse carestie, né quella di creare grandi aziende agricole di proprietà pubblica.

Si hanno solo dati qualitativi su queste possibilità. Quanto al loro impatto quantitativo su tutto il benessere di un paese e sulla forza di coesione di esso si

sono avute solo osservazioni marginali senza grande specificazione. Chiarissima peraltro sarà la graduale scomparsa del monopolio e dell'oligopolio agricolo dovuta a una maggiore libertà degli scambi. Ciò affinerà potentemente l'efficienza degli operatori economici.

A titolo indicativo, la gradualità nella realizzazione della internazionalizzazione agricola può configurarsi con alcuni riferimenti quantitativi e precisi cicli temporali. Essa potrebbe partire da una prima riduzione dei presenti aiuti pari a un complessivo 30 per cento come proposto dalla CEE, e nei cicli temporali successivi altre riduzioni del 20 per cento ciascuna fino a raggiungere il 90 per cento come proposto con autorità politico-militare dagli Stati Uniti, onde un massimo di protezione permanente del 10-15 per cento, accettabile da tutti i paesi interessati, dovuta all'impatto dei fattori esogeni e non ai "factor endowment ratios" di B. Ohlin, accolti da V. Del Punta nella sua *Teoria pura del commercio internazionale.*

Il terzo teorema valido per il futuro dell'economia agricola italiana consiste nella difesa pubblica, per un certo tempo, di coloro i quali non hanno potuto, senza propria volontà, quindi anche per una questione di rettitudine, allinearsi alle nuove forme tecnologiche e perciò non sono equipaggiati per il futuro e i relativi condizionamenti dei rapporti economici. Quindi deve ritenersi responsabile la collettività attraverso gli strumenti pubblici di assistenza dei settori e delle categorie professionali piú colpiti dalla internazionalizzazione dell'economia agricola. Già si è osservato che questa internazionalizzazione, che porta alla trasformazione della struttura produttiva nazionale, colpisce soprattutto i capitali investiti nelle piccole imprese e la relativa manodopera.

Riparare agli svantaggi di settore della libertà economica internazionale è un problema di equità e costanza di distribuzione dei redditi del paese. Nell'ambito di ogni generazione, il maggiore vantaggio, in termini di ricchezza, di reddito, di risparmio generati dalla nuova libertà economica internazionale, spetta in primo luogo all'economia nazionale come un tutto, che godrà di una nuova e maggiore situazione complessiva. Perciò vale il principio irrinunciabile che nessun settore economico come nessun operatore economico devono per la stessa causa, quando tecnicamente possibile, conseguire un vantaggio a carico di un altro settore o operatore economico. Almeno una parte di quel vantaggio generale dovrebbe essere devoluta ai settori svantaggiati.

Questa devoluzione potrebbe realizzarsi in vari modi, entro i limiti di una certa percentuale del PIL. Ciò con investimenti finanziati a favore degli operatori colpiti per correggerne la bassa produttività; con fondi e altri proventi per fare fronte alle maggiori spese di produzione; con sgravi fiscali per i trasferimenti professionali, ecc. Naturalmente, tutto ciò non dovrebbe avere una sopravvivenza eterna.

I fondi cosí erogati non dovrebbero trarsi solo dai settori in espansione notevolissima di ricchezza, di redditi e di risparmio che si otterrebbero con la internazionalizzazione agricola, ma anche in parte dalle finanze pubbliche dato

che tale incremento di ricchezza, di reddito e di risparmio è opera del miglioramento di efficienza del fattore di produzione stato.

La limitatezza del tempo eviterebbe che i fondi di compensazione siano a carico di generazioni che non ne godono e che le aziende agricole con imprese di scarso rendimento diventino con una politica di libero mercato internazionale come le aree del Terzo Mondo.

L'attuale politica della CEE punta invece a sostenere con vari interventi protezionistici non solo le unità agricole di minore dimensione ma anche quelle medie. Ma ciò sarebbe in pratica un rinvio sine die della internazionalizzazione e dovrebbe pertanto evitarsi. Per questi motivi l'assistenza dovrebbe essere temporanea e soprattutto finanziaria.

I tre teoremi sopra illustrati sono dunque, pur senza valori numerici, una conclusione normativa per la valutazione e estimo di alcuni effetti economici e extraeconomici che nascerebbero da una maggiore internazionalizzazione dell'economia agricola italiana. Ciò per conseguire i migliori risultati in modo da non essere guidati solo dalle passioni di parte, per quanto vi siano sempre incertezze nel mondo della scienza economica ma tali da non dover seguire una strada differente [2].

THREE THEOREMS ON THE VALUATION AND ASSESSMENT OF SOME EFFECTS AND OTHER RESULTS DESCENDING FROM A LARGER INTERNATIONALIZATION OF THE ITALIAN AGRICULTURAL ECONOMY

Given the increased economic friendship between the European Community of the Twelve and the U.S. Administration, we examine three criteria, or theorems, for the valuation and assessment of the economic effects and other results of a probable larger internationalization of the Italian agriculture.

According to this examination, the following conclusion can be drawn: the three theorems can describe with good accuracy the state of maximum equilibrium of the *best social will* present in the Italian economic sector of agriculture. But only the future will verify or disprove this conclusion.

[2] **Per la genesi di quanto contenuto nel testo, si vedano dell'a., oltre ad altri scritti anteriori e posteriori, i due volumi:** *La politica economica dei grandi sistemi coercitivi* **(1937), II ed., Padova, Cedam, 1969;** *Lo stato sociale moderno* **(1946), II ed., Padova, Cedam, 1962.**

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ASPECTS OF U.S. FINANCIAL DEREGULATION

by
KAREL HOLBIK *

I. *Deregulation in Perspective*

For the past two decades, domestic financial deregulation and international financial liberalization have changed the competitive structure and markets in many Western countries, including the United States. In addition to the rapid progress in computer technology and telecommunication, many other factors have contributed to this new development. Among them, accumulation of financial assets in private households and enterprises, and the need to diversify their use.

Savers' attitude to banks and banking has undergone a change, too. Inevitably, pressures and opportunities emanating from this evolution have called forth changes and innovations in financial systems. Their deregulation and liberalization have become an objective of public policy aiming at improvements in financial intermediation and financial market efficiency.

As a result, impressive changes have taken place in bank product innovation, in competition, as well as in the growing integration of financial institutions and money and security markets. A dramatic progress in financial modernization is underway.

The on-going financial deregulation does away with old restrictions and affects interest rates as well as fees for financial services; causes expansion in the number of competing suppliers of financial services; gives rise to new financial (debt) instruments; liberalizes lending and investing operations; despecializes financial institutions, thus making it possible for them to engage in a wider range of activities; and finally, inhibits concentration in the banking industry.

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Especially in the United States, the deregulation movement has in the last decade advocated competition on a "level playing field" with equal terms and conditions for all market participants. In a way, U.S. banking has followed the general objective of integration which results from both market developments and policies designed to minimize barriers between previously specialized financial institutions and market segments. Undeniably, since the October 1987 stock market crash, the need for greater integration between financial regulations and supervision has gathered momentum. This is also the consequence of recent bankruptcies of many American savings and loan associations.

The overall purpose of the contemporary liberalizing and deregulating measures taken in the Atlantic area, including the U.S., is to respond to the complex and rapidly changing internal and international needs of the financial service industry. The time has come to dismantle institutional obstacles to competition and to facilitate expansion of banks and other financial institutions. Public policy has, in fact, permitted most of these institutions to multiply and diversify their functions and to expand geographically – for the ultimate benefit of the more efficient and, therefore, more productive and profitable financial and banking systems.

As in some West European countries, American deregulation began in the 1970's by the removal of interest rates ceilings (and by phasing out Regulation Q) and by raising the asset powers of both banks and non-banks. Doubtless, interest rate regulation has improved the working of market forces and the allocation of both financial and real resources. Deregulation has also stimulated creation of new financial (especially savings and investment) instruments. This "product innovation" has contributed to a broadening and strengthening of financial markets in individual national economies and has, in fact, taught public debt managers how to use the instrument innovation in dealing with public borrowing requirements.

II. *Comparative Features of U.S. Banking*

While the fundamental institutions and functions of the Free World's banking systems are very similar, the American system contains certain distinct characteristics of its own.

The best known feature of U.S. banking is perhaps the large number of commercial banks (about 14,200 corporations with 43,000 branch offices) chartered by either federal or state authorities. This has many implications, including those for the conduct of U.S. monetary policies.

Another noteworthy feature is the absence in the United States of industrial-banking links which are common in many other countries where banks typically own commercial and industrial enterprises. The practices of U.S. bank holding companies have made a minor dent into this principle of bank-commerce separation.

The third characteristic of the U.S. financial system is the separation of banking from "non-bank" financial services and securities activities. Where this separation does not exist, as for example in West German, French, Swiss and Italian "Universal" banks, there is financial integration. The well-known Glass-Steagall Act of 1933 prohibited U.S. banks to underwrite and trade in corporate debt and equity. Again, bank holding companies activities have reduced somewhat the degree of this existing segmentation within the U.S. banking sector.

Another essential feature of U.S. banking is the structure of its supervision. Not only are U.S. banks and securities firms supervised by different agencies, but bank supervision is entrusted to 4 authorities: the U.S. Comptroller of the Currency, the Federal Reserve Banks, the Federal Deposit Insurance Corporation, and State Banking Commissions. These authorities regulate banks by type of firm and not functionally, i.e., by type of activity. Overlapping between the multiple supervisors has been criticized for a long time. It is also clear that U.S. supervisory practices differ from those of other countries', especially those where there are universal systems.

Finally, U.S. banking is characterized by the fact that all insured depository institutions are eligible to open Federal Reserve accounts and that they have access to central bank credit. However, the avenues open to banks are not open to securities firms.

III. *Bank Regulation and Deregulation*

The American banking system has been highly regulated which in itself is not unusual. Very briefly described, the reasons for bank regulations are based on the strong public interest in this industry because its malfunctioning has as a rule had detrimental consequences for the economy and people's well-being. The unstable history of U.S. banking until World War II contains proofs of this.

Bank regulations are concerned with (*a*) bank safety; (*b*) efficient operation of the payments (funds-transfer) system; (*c*) prevention of economic concentration ("big banking"); (*d*) consumer protection so that the public is not taken advantage of by powerful providers of financial services;

and finally, (*e*) the composition of bank earning assets and deposits which affect the money supply and, therefore, national monetary policy.

These 5 regulatory objectives have been achieved by, for example, chartering requirements, including minimum capital requirements, and by projections of earning prospects. Another effect of such basically restrictive measures has been to limit entry into the banking industry. Banking regulations use also interest rates paid or charged, and focus on the financial services ("products") offered, on the number of firms authorized, and on their geographical location. Because of the aforementioned separation of finance and commerce, American banks have traditionally been unable to offer nonfinancial products. Finally, Federal Reserve regulations/controls of bank reserves have the purpose of influencing the central banks' monetary policy.

Has U.S. banking regulation been useful and successful? There is no convincing evidence for a conclusive answer. The benefits of regulation vary over time and change with the business cycle. Weakening markets favor regulation, strong market do the opposite. The appeal of deregulation in the 1970's was raised by growing dissatisfaction with the performance of other regulated industries as well. In banking, deregulation could not be postponed inasmuch as the legislation passed during the Great Depression of the 1930's proved ineffective, if not obsolete. Moreover, as a result of inflation which began in the 1960's, the high and changeable interest rates encouraged the by-passing of deposit rate ceilings, product restrictions and other regulations. Yet inflation, volatile interest rates and substantial interest-rate risks made regulatory constraints, imposed on banks, quite burdensome. The catalytic influence of the simultaneous dynamic changes in computer, telecommunications and other technologies made deregulation in U.S. banking unavoidable.

Among the initial American strategies was to adjust the Federal Reserve System's Regulation Q ceilings so that thrift institutions could pay higher interest rates on their time deposits. Yet this strategy did not work since money market mutual funds (and other innovations) caused the thrifts and commercial banks, too, to lose many deposits. The time had come for a major financial reform.

IV. *The Reforms of the 1980's*

Throughout its history, the structure of the American banking and financial system experienced numerous reforms. As is well known, the

country's central bank, the Federal Reserve System, was not established until 1914. Most of the past reforms, including those of the 1930's, introduced as a result of the Great Depression and financial collapse, were occasional, piece-meal, unsystematic. The reforms carried out or suggested in the 1980's had more cohesiveness since they were a response to a changing economic environment in the country and in the world. The reforms begun in the 1970's represented a reaction to the existing financial organization which was found antiquated by both the financial industry and the U.S. Congress.

(*a*) Among the many issues which Congressional committees started to examine were, for example, the nature of the financial services required by consumers, businesses and institutions; the blurring of differences between the types of services offered by various depository institutions; the competition between banks and nonbanks (i.e. firms making loans but not authorized to accept deposits); the need to have the same regulatory and supervisory requirements for all types of financial enterprises; the separation of depository institutions from those engaged in the securities business; the restrictions imposed on interstate depository operations of commercial banks; the desirability of a reconsideration of the traditional intimate involvement of the Federal and state governments in the financial system; the complex and often overlapping regulations and standards for financial institutions administered sometimes by agencies which differ even in their economic philosophies; and, finally, the need of having (hopefully) one agency for the regulation and supervision of banks and another agency for deposit insurance for all forms of financial institutions.

(*b*) The cornerstone of the deregulation are two laws passed in 1980 and 1982, respectively, namely, the Depository Institutions Deregulation and Monetary Control Act (DIDMCA) and the Garn-St. Germain Depository Institutions Act (DIA). They laid the groundrules for a reformed and more competitive financial system. Yet while permitting a more intensive competition in U.S. banking, these Acts lowered the standards for bank safety and cannot therefore escape responsibility for an unprecedentedly large number of bank failures. (Over 250 savings and loan associations and mutual savings failed in 1982. As many as 206 commercial banks failed in 1989). Nevertheless, because of DIDMCA, all depository institutions are treated more equally and the distinctions between the different depository institutions have become blurred. On the other hand, this legislation permitted the American financial system to inaugurate a multitude and variety of financial instruments as the appended table reveals.

Major Deregulation Provisions of the Depository Institutions Deregulation and Monetary Control Act of 1980 and the Depository Institutions (Garn-St. Germain) Act of 1982

1. Deposit-Rate Ceilings
   - Requires a phaseout of all deposit ceilings at all depository institutions over 6-year period ending 1986.
   - Establishes the Depository Institutions Deregulation Committee to prescribe deposit ceilings and supervise orderly phaseout.
   - Removed ceiling interest-rate differentials between commercial banks and thrift institutions.

2. Loan-Rate Ceilings
   - Preempts state usury ceilings on business and agricultural loans in excess of $25,000 for three years unless state reimposes ceilings.
   - Eliminates state usury ceilings on residential mortgages unless state reimposes ceiling within three years.

3. Financial Services
   - Permits personal NOW accounts at all depository institutions.
   - Permits federal institutions to accept business demand deposits in connection with business loans.
   - Permits all federal credit unions to offer share drafts.
   - Permits federal SLAs to offer trust services.
   - Permits federal SLAs to offer credit cards.
   - Permits federal thrift institutions to invest in consumer loans (30 percent of assets), commercial loans (5 percent), commercial real estate loans (55 percent), leasing (10 percent), and municipal bonds.
   - Permits all depository institutions to offer money-market deposit accounts without ceiling rate.
   - Permits all depository institutions to offer variable-interest-rate mortgages.
   - Removes prohibition on due-on-sale provisions on mortgage loans made by all depository institutions.

4. Geographical Restrictions
   - Permits, with some size restrictions, interstate acquisitions of any type of failing depository institution by any other depository institution.

A complete description of the deregulatory legislation would include also the Competitive Equality Banking Act of 1987 and the Financial Institutions Reform, Recovery and Enforcement Act of 1989 (The "Thrift Act.")

(*c*) As a result of the deregulation process, commercial banks have lost their dominant position as suppliers of transaction (demand and time deposit) accounts. Consequently, at the present time all depository institutions, including the thrifts (saving and loan associations, mutual savings banks and credit unions) are authorized to offer interest-bearing checking accounts,

such as NOW, SUPER-NOW and money market accounts. Some thrifts have been enabled to accept business demand deposits and extend business loans. A similar innovation was the permission given to all thrifts to make variable- or adjustable-rate mortgages on the one hand and to extend consumer, business and commercial real estate loans on the other hand. Functional as well as geographic expansion of financial instruments has been facilitated by holding companies (which operate thousands of non-banks).

(*d*) Because of an historically unprecedented postwar of growth of bank branching, branching restrictions have come under attack since they tend to stall geographic expansion of markets. While *federal* laws continue to prevent interstate banking (of national banks), such banking carried out by *state* banks has encountered few obstacles, in fact, it has grown remarkably. This is due to the impact of regional banking and the activities of holding companies. It is beyond the scope of this paper to describe how little by little the old barriers to interstate banking have been cracked. But they have indeed been depressed.

(*e*) Although DIDMCA and DIA have changed many an existing regulation, their influence on the regulatory structure has remained minimal inasmuch as relations between the regulatory agencies may still be referred to as a case of "competition in laxity", i.e. the regulatory agencies may still get into each other's way.

In recent decades, several calls have been made for some meaningful changes in this situation, namely, in the Hoover Commission Report (1949), in the Report of the Commission on Money and Credit (1961), in the Hunt Report (1971) as well as in the Bush Commission Report of 1984. But nothing else than "patchwork" measures have resulted since there is no agreement about the optimal type of regulation for the hydra-headed Federal regulatory system. DIDMCA has, in fact, minimized the Federal Reserve's role as a regulator by reducing the advantage and cost of the Fed's membership and by increasing the Fed's role as a supplier of its services to all depository institutions.

(*f*) Since the Great Depression and the passage of the Glass-Steagall Act of 1933, the American financial system has been characterized by a conspicuous idiosyncrasy – the separation of commercial from investment banking referred to above. As a consequence, investment banks need not, for instance, obtain special charters as commercial banks have to, or be incorporated. Commercial banks, on the other hand, are not permitted to underwrite private (corporate) securities. In this respect, too, the dynamic environmental changes of the 1970's and 1980's and, specifically, the new

financial instruments and services have made new opportunities available to commercial as well as investment banks.

The ensuing liberalization of financial activities has threatened this institutional separation with a collapse, sooner or later. In the meantime, many legislative amendments introduced in the U.S. Congress have resulted in compromises between permissible and nonpermissible securities transactions. However controversial, the role of commercial banks' brokerage services has grown regardless of the fact that banks cannot as yet engage in either underwriting or distribution and trade of corporate securities (although they do so with U.S. Government and other public government debt instruments).

V. *Bank Reforms and the Banking Structure*

In conclusion of this brief and selective account of deregulation in the American banking industry, it may be appropriate to highlight the cumulative effect of the liberal economic, financial and legal policies on the industry's structure. The changes shown in the following tabulation of assets speak for themselves. (The gains of foreign banks represent an increase from $45 billion to $462.7 billion).

	1976	1987
All banking organizations	58.2%	49.8%
Savings and loans	22.3	24.2
Mutual savings banks	7.8	5.0
Credit unions	2.5	3.5
Finance companies	6.4	8.7
US branches and agencies of foreign banks	2.7	8.9
TOTAL	100%	100%

Source: *Federal Reserve Bulletin*, March 1989

Liberalized laws, relaxed regulations and easier restrictions were responsible for both the increase in total assets (from $1.72 trillion in 1976 to $5.2 trillion in 1987) and for the banking system's geographic expansion.

Although the number of commercial banks decreased between 1977 and 1987 from 14,398 to 13,753, this was not so much the result of bank failures (which rose from 6 in 1977 to 184 in 1987) and of a significant

conversion of independent banks into branches (156 in 176, 528 in 1987) as it was the outcome of the growth of mergers and acquisitions. The number of these rose from 135 in 1976 to 553 in 1984.

It is still typical of U.S. banking that, in terms of assets, it is dominated by some 6,400 small banking organizations, accounting for 62% of all banks. Yet the years of deregulation made gains in bank concentration also possible since during the period of 1977-1987 the asset share of the 100 largest bank organizations rose from 50% to 62%.

Multibank holding companies were the most important promoters of acquisitions so that, by 1987, they controlled 4465 banks with 70% of all banking assets. Among the principal incentives for mergers and acquisitions were the conventional ones, i.e. to realize the cost benefits of large-scale operations and to increase the range of diversified products. There is no denying that competition among banks and with thrift institutions has intensified and has made most banks more profitable.

Bank expansion has been stimulated primarily by liberalized *state* banking regulations and less by Federal regulations. State authorities have not generally hesitated to permit bank expansion within states and across state lines. They have encouraged both intrastate and interstate geographic bank expansion, especially since 1982. While before that time only the State of Maine permitted expansion across state borders, in 1987, 45 states legalized such enterprises. Interstate mergers rose dramatically after the Supreme Court declared regional interstate contact constitutional, and development along these lines has not stopped. It is, in fact, conceivable that progress in liberal legislation will permit unconditional entry by out-of-state banks on a national basis.

Those who have paid attention to recent developments in American banking may have been puzzled by the observable conflict between the liberalizing spirit of the methods of deregulation described above and the strict examinations which many national banks are being subjected to. Some say that such examinations are not only regulatory excesses but are also the cause of the "credit crunch" which is responsible for economic stagnation in some regions.

The thorough bank examinations being carried out at present have as their principal objective identification of unproductive property (real estate) and urban development loans extended in the past by large financial institutions. But is this a retreat to conservative banking? It is only in the sense that banks are discouraged from using excessively liberal lending methods common in the 1980's. There appears to be a need for the implementation of the "old" rules of prudential lending to ensure that new loans are safe and

INNOVATIONS IN FINANCIAL MARKETS

Innovation	*Year Introduced*	*Introduced by*	*Currently Used by*
Instruments			
Term loan (fixed rate)	1950	Banks	Banks
Term loan (variable rate)	1970s	Banks	Banks
Federal funds	1920s, 1960s	Banks	Banks
Special checking account	1935, 1950s	Banks	Banks
Eurodollars	1950s	Bank depositors	Banks
CD (fixed rate)	1961	Banks	Depository institutions
CD (variable rate)	1977	Banks	Banks
CD (zero coupon)	1981	Banks	Banks
Credit card	1920s, 1960s	Banks	Depository institutions
Mortgage-related securities	1970, 1977	Government Banks	Gov't & depository institutions
Leasing	1960s	Banks	Banks
Financial futures contract	1975	Market maker	All investors
Variable-rate residential mortgage	1920s, 1975	Savings & loan assocs.	Depository institutions
Graduated-payment residential mortgage	1976	Government	Depository institutions
Municipal-bond mutual shares	1976	Mutual funds	Mutual funds & investment banks
Money-market shares	1974	Mutual funds	Mutual funds & investment banks
Original-issue discount bonds (OIDs)	1981	Investment banks	All institutions
Repurchase agreement (business)	1960s	Banks	Banks
Repurchase agreement (consumer)	1980	Depository institutions	Depository institutions
Financial options	1920s	Market maker	All investors
Options on financial futures contracts	1982	Market maker	All investors
Money-market deposit accounts	1982	Depository institutions	Depository institutions
NOW accounts	1972	Savings bank	Depository institutions
Super-NOW accounts	1982	Depository institutions	Depository institutions
Collateralized mortgage obligations (CMOs)	1983	Government	Mortgage bankers
Zero-coupon Treasury collateralized (animal) bonds	1982	Investment banks	Investment banks
Variable-rate preferred stock	1982	Investment banks	Investment banks
Stock market index futures contract	1982	Market maker	All investors
Share draft	1974	Credit unions	Credit unions
Zero-coupon Treasury bond (STRIPS)	1985	U.S. Treasury	
Services			
Automatic teller machines	1974	Banks	Depository institutions
Point of sale	1974	Saving & loan assocs.	Depository institutions
Telephone deposit transfer	1975	Saving & loan assocs.	Depository institutions
Preauthorized deposit transfers	1970	Saving & loan assocs.	Depository institutions
Mortgage insurance	1968	Insurance cos.	
Municipal-bond insurance	1971	Insurance cos.	
Shelf registration (SEC Rule 415)	1982	Investment banks	
Foreign currency swaps	1981	World Bank	All investors
Interest-rate swap	1982	Investment banks	All investors and institutions
Institutions			
REITs	1920s, 1960s		
Money-market mutual funds	1974		
Municipal-bond mutual funds	1976		
Municipal-bond unit trust	1961		
Federal-agency mutual funds	1978		

NEW REGULATORY STRUCTURE

Treasury Department

Office of the Comptroller of the Currency
- No major change in duties

Office of Thrift Supervision
- Charters federal S&Ls
- Establishes S&L regulations
- Supervises both federal and state-chartered S&Ls, and S&L holding companies

FDIC
- FDIC's Board of Directors expanded from 3 to 5 members and will include the Director of the Office of Thrift Supervision

Bank Insurance Fund (BIF – same as original FDIC fund)
- Insures deposits of commercial and savings banks
- Manages assets and liabilities of insolvent banks

Saving Association Insurance Fund (SAIF – replaces FSLIC)
- Insures deposits of S&Ls
- Manages assets and liabilities of insolvent S&Ls *after 1992*

FSLIC Resolution Fund
- Manages the remaining assets and liabilities of some 200 S&Ls taken over by the FSLIC prior to 1989

Resolution Trust Oversight Board
- Oversees the Resolution Trust Corporation
- Chaired by the Secretary of the Treasury. Includes the Federal Reserve Board Chairman, the Secretary of Housing and Urban Development, and two others appointed by the President

Resolution Trust Corporation (managed by the FDIC)
- Manages the assets and liabilities of S&Ls that become insolvent between 1989 and August 1992
- Can use $50 billion that will be raised by the Treasury and the Resolution Funding Corporation to resolve S&L problems
- Ceases to operate after 1996, when its responsibilities are shifted to the FDIC's Savings Association Insurance Fund

Resolution Funding Corporation
- Issues up to $30 billion of long-term bonds to finance the activities of the Resolution Trust Corporation

Federal Housing Finance Board
- Oversees the 12 regional Federal Home Loan Banks

Federal Home Loan Banks
- Lend (make advances) to member institutions, which may include banks and credit unions as well as S&Ls

Federal Reserve
- No major change in duties

sound. This need is magnified by the deplorable crisis of U.S. thrift institutions. These conditions in American banking are an unwelcomed development in the face of expanding financial globalization.

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ASPETTI DELLA DEREGOLAMENTAZIONE FINANZIARIA NEGLI STATI UNITI

Negli anni Settanta, gli Stati Uniti, come molti altri paesi occidentali, iniziarono la liberalizzazione e deregolamentazione della loro struttura e mercati finanziari. La caratteristica particolare della deregolamentazione bancaria americana fu la necessità di abolire o ridurre molte restrizioni imposte all'industria bancaria durante e a partire dalla Grande Depressione degli anni Trenta. Questo articolo esamina soprattutto le componenti fondamentali del sistema bancario americano che comprende circa 14.000 banche indipendenti dove persiste la divisione tra banche commerciali e banche di investimento e dove la supervisione bancaria è affidata a 4 enti (con giurisdizioni che si sovrappongono). La deregolamentazione si è realizzata sulla base di leggi approvate nel 1980, 1982, 1987 e 1989. Vengono qui descritti i principali provvedimenti, innovazioni e risultati. L'articolo getta luce sulla recente instabilità delle banche americane e sull'urgenza che il sistema bancario venga sottoposto a un processo di chiarificazione.

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UNEMPLOYMENT, WELFARE AND IMMISERIZING GROWTH

by
HAMID BELADI * and JOHN RAPP *

I. *Introduction*

The possibility that factor accumulation or technical progress actually causes a decline in the real income of a trading country is a result that trade theorists have inherited from Edgeworth who wrote about it as early as 1899. This is the so-called paradox of immiserizing growth in a small economy. Bhagwati (1958) demonstrated the possibility of growth-induced deterioration in a country's terms of trade that under certain conditions causes a decline in real income. Johnson (1967) and subsequently Bhagwati (1968, 1973) examined the possibility that a small economy may be immiserized if the country suffers from either policy induced distortions such as tariffs or institutional distortions such as inter-industry wage differentials. Their analysis was followed by a series of related studies including Batra and Scully (1971) and Yu (1978) among others.

It is interesting to note that both Johnson and Bhagwati examine the possibility of immiserizing growth using a trade model where the country suffers from market distortions, but otherwise enjoys full employment. In this paper, we deploy the Batra-Beladi unemployment model (1988) and analyze the paradox of immiserizing growth. We obtain some interesting results. For example, in the presence of unemployment, an improvement in the terms of trade causes a rise in real income. And if the country is large, an endogenous, own-growth-induced improvement in the terms of trade may reduce rather than increase the rate of growth, so that this endogenous, own-growth-induced improvement in the terms of trade may be compatible with immiserizing growth.

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II. *Assumptions and the Model*

Following Batra and Beladi (1988), consider an economy consisting of two sectors, X and Y. (X and Y represent the exportable and importable sectors respectively). Each sector is utilizing two non-specific factors, capital (K) and labor (L). The importable sector is also using a specific factor, land (V). Production functions are linearly homogenous and quasi-concave. Factor supplies are inelastic and producers face perfect product and capital markets. Non-specific factors are fully mobile and employed, but the real wage is rigid in a downward direction, causing unemployment in the labor market.

The production side of the model is given by the following equations,

$$X = X(K_x, L_x) \tag{1}$$

$$Y = Y(K_y, L_y, V) \tag{2}$$

Where L stands for labor, K for capital, V for land. Taking product and factor prices as given, the exportable firm's sector maximizes profits when,

$$W = PX_L(K_x, L_x) \tag{3}$$

and,

$$r_x = PX_K(K_x, L_x) \tag{4}$$

Similarly profit maximization on the part of the importable producer's sector yields,

$$W = Y_L(K_y, L_y, V) \tag{5}$$

$$r_y = Y_K(K_y, L_y, V) \tag{6}$$

and

$$\rho = Y_V(K_y, L_y, V) \tag{7}$$

Where X_j, and Y_j, are respectively the marginal products of the jth factor in the two sectors, P is the relative price of X, W is the real wage expressed in terms of Y, ρ is the real rental of land and r_x and r_y are the real rental of capital in sectors X and Y respectively. If capital is fully mobile, then in long run equilibrium, $r_x = r_y$. With full employment of capital and land, we have,

$$K_x + K_y = L_x k_x + L_y k_y = \bar{K}$$
$$V = vL_y = \bar{V} \tag{8}$$

Where $\bar{V}$ and $\bar{K}$ are respectively the inelastic supply of capital and land. We assume that Y is the numeraire, so that its price equals 1. This model consists of eight equations in eight variables, X, Y, K_x, K_y, L_x, L_y, V and ρ, and four parameters, $\bar{K}$, $\bar{V}$, W and P. With linearly homogenous production functions, equations (3) – (6) can be written as,

$$W = PX_L(k_x) \tag{9}$$

$$W = Y_L(k_y, v) \tag{10}$$

$$PX_K(k_x) = Y_K(k_y, v) \tag{11}$$

Where $k_i = (K_i/L_i)$, is the capital-labor ratio in the ith sector and $v = (V/L_y)$ represents the significance of land in the importable sector, expressed in terms of labor employed in this sector. Equations (9) – (11) contain three variables, k_x, k_y and v and two parameters, P and W. As correctly pointed out by Batra and Beladi (1988), in this model as in the standard two-sector Heckscher-Ohlin model of fully employed economy, factor proportions are independent of factor endowments; hence, factor prices are also independent of factor supplies and they depend only on P and W.

III. *The Analysis*

The model developed in the preceding section can now be utilized to examine welfare and immiserizing growth in the presence of unemployment. Differentiating (9) – (11) totally and assuming for simplicity that $P = 1$ initially, we obtain,

$$(dk_x) = -(W/X_{Lk})\, dP \tag{12}$$

$$(dk_y) = (1/J)\, Y_{Lv}(WX_{Kk} - rX_{Lk})\, dP \tag{13}$$

$$(dv) = (1/J)\, Y_{Lk}(rX_{Lk} - WX_{Kk})\, dP \tag{14}$$

where, $J = -X_{Lk}[(Y_{Kk}Y_{Lv} - Y_{Lk}Y_{Kv})]$ is clearly positive since when $Y_{KK} < 0$, then Y_{Kk} is also negative and when $Y_{LV} < 0$, Y_{Lv} is also positive. Hence (dk_x/dP) and (dk_y/dP) are negative, whereas (dv/dP) is

positive. Now, differentiating the production functions and the full-utilization equations with respect to P and after a little manipulation we obtain,

$$(dX/dP) = (Vf/k_x)(dv/dP) - [f(L_y/k_x)(dk_y/dP)] - [L_x(f - k_xX_k)/k_x](dk_x/dP) \tag{15}$$

and,

$$(dY/dP) = L_yY_k(dk_y/dP) - (1/v)(g - vg_v)(dv/dP) \tag{16}$$

where $f \equiv X(k_x, 1)$ and $g \equiv Y(k_y, v, 1)$. It is clear from (15) and (16) that since $(dk_i/dP) < 0$, and $(dv/dP) > 0$, $(dX/dP) > 0$ and $(dY/dP) < 0$. Moreover, we may write, $y = f(X)$, where $f' = (dY/dX) = [(dY/dP)] < 0$, so that the transformation curve in our model is not linear despite the presence of unemployment. However the equilibrium value of f' is not equal to $-P$. The social marginal rate of transformation is derived from total differentiation of (1) and (2) and the use of conditions (9) – (11) along with the requirements that $dL = dL_x + dL_y$, $dV = 0$ and $dK_x = -dK_y$. Then the social marginal rate of transformation is given by,

$$(dY/dX) = -P(1 - \Psi) \tag{17}$$

where $\Psi = X_L(dL/dX)$ which is less than 1 and the sign of (dL/dX) depends on the sign of (dL/dP), since $(dL/dX) = (dL/dP)/(dX/dP)$, so that the marginal rate of transformation depends on the elasticity of the land/labor ratio with respect to P in the importable sector and the capital intensity in the two sectors. And $(dL, dP) > 0$ if $k_y \geq k_x$.[1] Note further that (dL/dP) may be positive even when $k_x > k_y$, (i.e. if the capital intensity difference and the elasticity of the land-labor ratio in the importable sector are small). However, if the capital-intensity difference is very wide with $k_x > k_y$ and the land-labor ratio in the importable sector is highly elastic, then (dL/dP) and hence ψ will be negative. In any case, if (dL/dP) is not equal to zero the marginal rate of transformation will be different than $-P$.

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[1] The expression for the change in employment with respect to the relative price of X is given by,

$$(dL/dP) = (L_y/k_x)(k_y - k_x\eta_v - [L_x(dk_x/dP) + L_y(dk_y/dP)](l/k_y)$$

where η_v is the positive elasticity of land-labor ratio with respect to P and $(dk_i/dP) < 0$. This expression is derived by setting $P = 1$ initially. For more details see BATRA and BELADI (1988).

Let I be national income. Then,

$$I = PX + Y \tag{18}$$

Following Batra and Scully (1971), from (18) we can now obtain,

$$(dI/dP) = X\{1 + \epsilon_x [X_L (dL/dX)]\} \tag{19}$$

where $\epsilon_x = [(dX/dP)\ (X/P)]$ is the elasticity of the production of the exportable commodity with respect to the terms of trade (P). If labor was fully employed and inelastically supplied then $dL = 0$, so that $(dI/dP) = X > 0$. Thus, we obtain the traditional result that a deterioration (improvement) in the terms of trade in the absence of any distortions results in a decrease (increase) in national income. On the other hand, if $k_y \geq k_x$, then (dL/dX) and (dL/dP) are positive [2] and hence $(dI/dP) > 0$, so that if the pattern of trade is not reversed, the standard result that an improvement (deterioration) in the terms of trade results in an increase (decrease) in real income continues to hold in our model in the presence of unemployment. The following theorem now follows,

Theorem 1. *If the importable sector is the relatively capital-intensive sector, then an improvement (deterioration) in the terms of trade leads to a rise (fall) in real income and total employment in the labor-surplus economy.*

Note further that, even when $k_x > k_y$, (dL/dP) and hence Ψ may be positive, if the capital-intensity difference and the elasticity of land-labor ratio in the importable sector are small.

Next, if $k_x > k_y$ and the capital-intensity difference is very wide with a highly elastic land-labor ratio in the importable sector, then (dL/dP) and hence Ψ will be negative so that it is possible that $(dI/dP) < 0$. This happens if $\Psi < (1/\epsilon_x)$. In other words if Ψ is less than the inverse of the total absolute elasticity of the exportable commodity with respect to terms of trade changes, then an improvement in the terms of trade causes a fall in the national income of the labor-surplus economy and conversely. We now have the following theorem,

Theorem II. *In a minimum wage economy an improvement in the terms of trade will lead to a decline in national income if wage rigidity works against the importable industry.*

Let us now turn to the endogenous, growth-induced changes in the

[2] Note further that even when $k_x > k_y$, (dL/dP) may be positive, if the capital-intensity difference and the elasticity of the land-labor ratio in the exportable sector are small.

terms of trade and its effects on the rate of growth of national income in the presence of generalized unemployment. Differentiating (18) totally we obtain,

$$dI = (\partial I/\partial P)\,|_{\hat{G}}\, d\hat{P} + \partial I|_{\hat{P}} \tag{20}$$

Where $\hat{G}$ and $\hat{P}$ stand respectively for constant growth and constant terms of trade. By substituting (19) into (20) we have,

$$(dI/I) = (dP/I)\,X\{1 + \phi_x[X_L\,(dL/dX)]\} + (\partial I|_{\hat{P}}/I) \tag{21}$$

With full utilization of labor, (21) reduces to $(dP/I)\,X + (\partial I|_{\hat{P}}/I)$ which is unambiguously positive so that an improvement in the terms of trade will lead to a rise in the rate of economic growth which is not in proportion to the economic growth that could occur with constant terms of trade. Moreover, if the importable sector is the relatively capital-intensive sector, then (dI/I) in (21) is positive, so that an improvement in the terms of trade results in an increase in the rate of economic growth which is more than growth at constant prices. Note further that this increase in the economic growth rate is greater than with full employment of labor. The following theorem is now in order.

Theorem III. *In a minimum wage economy, an improvement (deterioration) in the terms of trade raises (lowers) the rate of economic growth above (below) that which would prevail with constant terms of trade. Furthermore, this increase in the rate of economic growth is greater (smaller) than with full employment.*

On the other hand, if $k_y < k_x$ and the capital intensity difference is very wide with highly elastic land-labor ratio in the importable sector, then an improvement (deterioration) in the terms of trade will lead to a rate of economic growth lower (higher) than that which could have prevailed with constant terms of trade. Thus the traditional results that an improvement (deterioration) in the terms of trade should raise (lower) a country's growth rate ceases to hold in the presence of unemployment.

An argument is sometimes advanced that growth-induced deterioration in the terms of trade has lowered the rate of economic growth for some developing countries. However, our model shows that this is not necessarily correct in an unemployment-plagued economy. Thus we deduce,

Theorem IV. *In a labor-surplus economy, an improvement (deterioration) in the terms of trade causes a decline (an increase) in the rate of*

economic growth and unemployment which is lower (higher) than that which could have occurred with constant terms of trade

At this point a few words regarding Theorem IV are in order. With full employment of labor ($dL = 0$), a deterioration in the terms of trade is a necessary condition for immiserizing growth to occur. However, in the presence of unemployment, this condition ceases to hold. Moreover, if the importable sector is the relatively capital-intensive sector, then immiserizing growth may occur if the gain from an improvement in the terms of trade is outweighed by the loss from growth which is measured at constant commodity prices. Immiserizing growth may also occur if the loss of income from growth-induced improvement in the terms of trade outweighs any gains from growth measured with constant terms of trade, despite the presence of generalized unemployment and factor specificity. It is interesting to note that our model generates results which accord well with the generalized theory of immiserization established by Bhagwati (1958, 1968, 1973), and hence our results indicate that immiserization may occur if growth takes place in the presence of a sub-optimal policy.

IV. *Concluding Remarks*

Using a two-sector, specific factor general equilibrium model of trade, we have examined the endogenous, own growth-induced improvement in the terms of trade and the possibility of immiserizing growth. Among other things we have shown that if the importable sector is relatively capital intensive:

a) An improvement (deterioration) in the terms of trade causes a rise (fall) in real income and total employment.

b) An improvement in the terms of trade raises the rate of economic growth above that which could occur with constant terms of trade and this increase in the rate of economic growth is greater than that which would prevail with full employment.

c) If the exportable sector is the relatively capital-intensive sector, then an improvement in the terms of trade will lead to a rate of economic growth lower than with constant terms of trade.

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DISOCCUPAZIONE, BENESSERE E CRESCITA CHE IMPOVERISCE

In questo articolo viene usato un modello di equilibrio generale di scambio internazionale con un fattore specifico per analizzare il paradosso di una crescita che, in presenza di disoccupazione, impoverisce.

Fra le altre cose si mostra che se il paese ha grandi dimensioni un miglioramento endogeno di terms of trade indotto dalla propria crescita può portare a un impoverimento.

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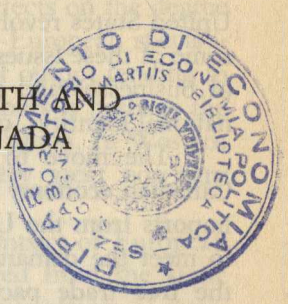

EXPERIENCE OF EEC TRADE GROWTH AND IMPLICATIONS FOR THE U.S.-CANADA FREE TRADE AGREEMENT

by
DARWIN WASSINK * and ROBERT CARBAUGH **

The recently approved U.S.-Canada Free Trade Agreement provides an opportunity to use some elementary economic models to demonstrate the changes in the analysis of international economic integration that have occurred [since the beginning of Western European integration]. Economists have examined the changes that could result from the gradual implementation of the agreement, but it has generated far less controversy in the U.S. than in Canada. The economic issues that have been debated in Canada are similar to the issues that were debated at the time of the establishment of the European Economic Community (EEC). This paper reviews the history of the early development of regional integration in the EEC, and determines whether the concerns expressed at that time provide insights into the differing viewpoints concerning anticipated effects of the U.S.-Canada Free Trade Agreement.

When analyzing the historical record of the EEC, it is interesting to consider how regional economic integration theory has evolved over the last three decades and how the empirical measures of the effects of EEC developments have contributed to this process. Over this time period, it appears that the relative importance of the static welfare effects of integration has become less emphasized in the economic literature than the dynamic effects. We will consider the theoretical reasons for this process as well as the empirical record.

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Canadian Debate

The debate in Canada over the desirability of a free trade pact with the United States revolved around political, social, and economic issues. While some of these issues are interrelated (e.g., whether increased U.S. ownership of businesses and resources in Canada would result in a loss of Canada's national identity), our interest is in the economic issues that were expressed.

The move to free trade is expected to result in dislocation in the Canadian economy as some firms find that they are unable to compete with imports from the United States and other firms find themselves expanding to meet the demand for expanded exports to the United States. Critics of the free trade pact questioned whether the costs of this dislocation of employment and production would exceed the benefits from free trade. There was also apprehension that free trade would lead to Canada largely becoming a natural resource exporter, while U.S. firms would dominate the Canadian market for manufactured goods. As skilled workers lose jobs in Canada's manufacturing and high-tech industries, which pay relatively high wages, the Canadian labor force could suffer. Although the free trade pact's costs to the Canadian economy are uncertain, it is clear that they would appear more important if the benefits of the pact were expected to be relatively minor.

European Experience

In the 1950's, the debate concerning the development of the EEC was dominated by political issues in the aftermath of World War II. However, the economic issues that were raised were somewhat similar to those being raised today concerning the Canada-U.S. Free Trade Agreement. An early investigation of the EEC [1] found concerns of Francesco Coppola d'Anna [2] – that the dislocation of industries with adjustment to free trade and the immobility of factors in Europe would be a serious problem – to be excessively pessimistic. Early analysis of the EEC's prospects also focused on the static welfare effects, and concluded that they would yield adverse effects for participating countries. Jacob Viner argued that the "trade-diverting" effects are likely to be more important than the "trade-creating" effects [3].

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[1] GEHRELS and JOHNSTON (1955).

[2] COPPOLA D'ANNA (1950, p. 9; as quoted in GEHRELS and JOHNSTON, 1955, p. 286).

[3] VINER (1950, as quoted in GEHRELS and JOHNSTON, 1955, p. 278).

Tibor Scitovsky [4] stated that "much of the hoped-for effects of economic union would require a much closer integration of Western Europe's economies than the mere establishment of a common market, and the latter is likely to exert its beneficial influence more through its effects on the degree and nature of competition than through the greater intra-European specialization it renders possible". He added that "reallocation of output tending to increase trade and specialization among the union's members is perhaps the main effect that pure theory would attribute to economic union. In Western Europe, however, this effect is likely to be neither very great nor very important".

As economists began to estimate the quantitative impact of European integration, it appears that more of the emphasis shifted from the static effects of trade creation and trade diversion to the dynamic effects of intra-industry specialization resulting from the gains from economies of scale, increased competition and rationalization of production. This has been reflected in the debate concerning the effects of the Canada-U.S. Free Trade Agreement, as there has been considerably more attention to the potential dynamic effects by the supporters.

Theory of Regional Integration

The assessment of the effects of a movement toward freer trade within a regional trading bloc depends on how a number of factors are modeled. In the political arena that determines the process of integration, each country is concerned about the effects of integration on its economy. The framework for analysis usually is the member country's economy relative to those of other countries in the trading bloc, as well as those outside the bloc. One factor that must be considered is whether the country is considered a "small country", that cannot affect the prices of goods it trades within or outside the bloc, or a country that is so "large" that pricing in the domestic market determines prices in international trade. The second factor that plays an important role in the theory of integration is the extent to which the production of traded goods achieves economies of scale. In cases where economies of scale are significant, the gains from integration are based on an assumption that the producing country has the ability to influence prices in international trade while most models of the static effects of integration assume the economy being studied is too small to influence prices. We will follow this dichotomy in consideration of the theoretical effects of integration.

[4] Scitovsky (1962, p. 32).

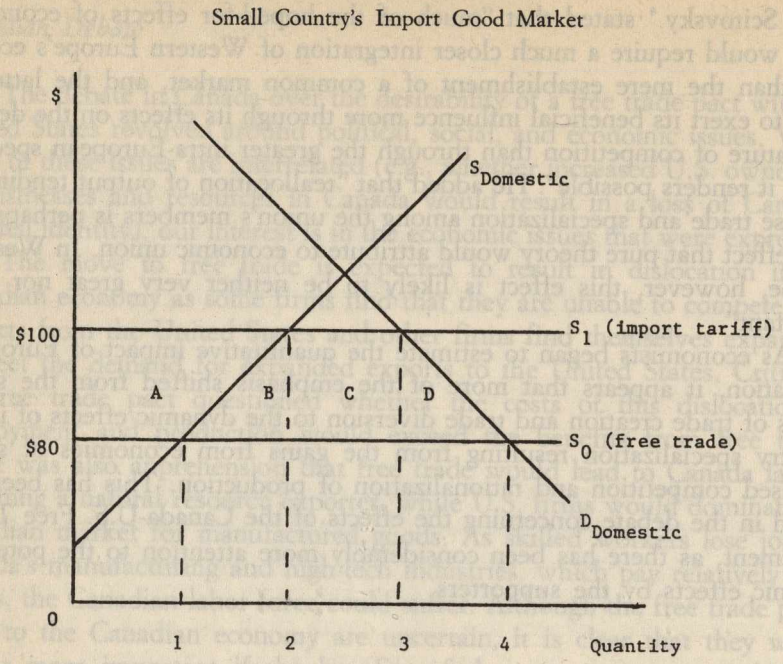

FIGURE 1. Import Tariff Reduction by a Small Country

Model of Static Effects of Bilateral Tariff Reductions

The simplest case of trade liberalization occurs when a relatively small country removes existing tariffs and other nontariff barriers to trade (e.g., quotas) applied to imports from one or more larger countries in exchange for a reduction in their barriers to the small country's exports. This also assumes a perfectly competitive market, in which trade occurs in standardized products, as well as constant returns to scale (i.e., no cost advantages from large-scale production). This results in changes in the small country's markets for both its import-competing goods and for its export goods.

Figure 1 utilizes supply and demand analysis to illustrate the benefits and costs to the small country when its tariffs are lowered on imports from larger trading-bloc nations. Assume the small country is a net importer in trade with other members of the trading bloc. With the import tariff in existence before the implementation of a regional free trade agreement, the small country faces a perfectly elastic supply of imports at a price of $100.

At this price the quantity demanded within the country is 3 units, the quantity produced domestically is 2 units, and imports total 1 unit.

When the agreement to eliminate tariffs within the bloc is implemented, the price of the imported and domestically produced good falls from \$100 to \$80. This leads to a gain in consumer benefits (consumer surplus) in the small country equal to area $A + B + C + D$. This sum consists of the cost saving on the 3 units that are purchased under the tariff, area $A + B + C$, plus the extra welfare gain associated with the consumption of an additional unit at the free-trade price of \$80, denoted by area D.

From a national point of view, the removal of the import duty results in gains and losses for different members of the small country's economy. The removal eliminates tariff revenue of the home country's government, denoted by area C, and represents a transfer of income from government to domestic consumers. The duty's removal also reduces the incomes of the small country's producers of this product, area A, and represents a transfer of income from producers to domestic consumers. What's more, the tariff's removal eliminates the protectionist price umbrella that permits inefficient domestic production. As the relatively inefficient domestic production contracts from two units to one unit under free trade, domestic costs fall by area B. Because resources can now be used in a more efficient manner, domestic welfare increases. The overall net gain to the small country from the tariff elimination equals area $B + D$. In summary, the small-country consumer's gains in real income (welfare) generally exceed by a small amount the losses suffered by its producers and government.

Under the regional free trade agreement, the larger trading partners remove import tariffs applied to the small country's exports: however, tariffs are left in place on imports from non-member countries. Domestic producers can now export their products to the trading partner at the world price plus the tariff which non-member countries still face. Domestic exporters thus realize gains equal to the tariff revenue that the partner countries collected on the goods previously exported as well as any non-member country exports that the duty-free domestic exports replace. The reduction in the partner country's tariff thus increases the net-of-tariff price received by the domestic exporters on each unit sold in the partner countries. In this small country case, the gains from bilateral free trade accrue to the small country.

Figure 2 illustrates the gains to the small country from bilateral free trade with a large trading partner. The figure contains a demand and supply diagram for the good for which the small country is assumed to be a net exporter to the regional trading bloc. Suppose the small exporting country

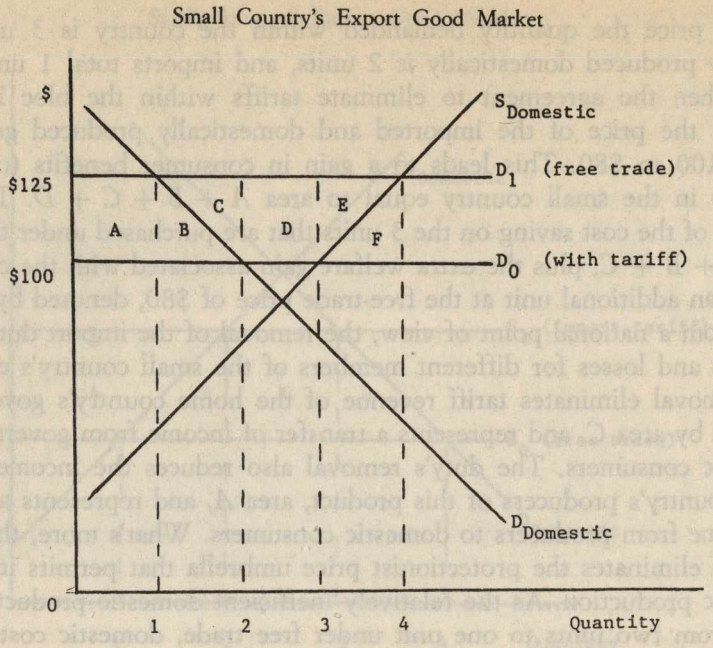

FIGURE 2. Tariff Reduction by the Partner Country: Impact on the Export Good Market of the Small Country

faces a perfectly elastic export demand schedule of its regional trading partner, denoted by D_0. This demand schedule includes a partner-country tariff applied to imports bought from the small country. After the implementation of a regional free trade agreement, the elimination of partner country's tariff increases the net-of-tariff price received by the domestic exporter on each unit from \$100 to \$125. This is seen as an upward shift in the export demand facing the small country from D_0 to D_1.

The increase in the small-country producer's net-of-tariff price results in an increase in producer surplus equal to area $A + B + C + D + E$. From a national perspective, area F represents the increased marginal opportunity cost of the extra unit supplied and thus is not included as welfare gain. The increase in the net-of-tariff price results in domestic consumer surplus falling by area $A + B$. This sum is transferred to domestic producers as producer surplus. The overall (net) gain of the tariff reduction by the trading partners in the regional free trade pact thus equals $C + D + E$, the amount by which the increase in producer surplus exceeds the reduction in

consumer surplus. There are two possibilities for the source of this net increase. In the case where the small country's exports replace exports from a lower-cost producer outside the free trade area, area $B + C + D + E + F$ reflects a revenue loss for the trading partners' governments that previously collected tariff revenue on the imports from non-member countries as well as on imports that had earlier come from the small country. In the case where the country's exports replace high-cost trading partner production, area $C + E$ reflects the gains from improved resource allocation within the region.

Under bilateral trade liberalization, the gains to the small country from reduced import tariffs by its trading-bloc partner exceed the benefits that occur when the small country reduces its import tariffs applied to goods bought from the trading-bloc partner. This is because of the tariff's revenue effect. Since the exporter is a small economy, lowering import tariffs by the large trading partner yields a revenue transfer from the large trading partners to the small-country's exporters of area $B + C + D + E + F$; this occurs when small-country exports replace lowest-cost exports from outside the free trade area. Area B offsets the loss in consumer surplus for the small country's producers, and area F accounts for the increased costs of the small country's producers. When the small-country's exports replace high-cost trading partner production, area $C + D + E$ is the net gain from trade creation as the large trading partner's producers shift production from this product to more competitive products. In this case the gains of the small country are net gains, while in the previous case the net gains of the small country are at the expense of a larger loss of tariff revenue by the large trading partner due to trade diversion.

Because the small country must accept prices determined in the international market, a domestic import tariff merely induces losses for domestic consumers and producers as seen in Figure 1. When there occur reductions in the large trading partner's tariffs applied to small-country exports, the small country gains from the improved price on its original exports and from the transfer of lost tariff revenues of the trading partners on the trade diverted to the small country. In this case, it is possible that the small member country could gain at the expense of even greater welfare losses of the trading partners.

Model of Dynamic Effects of Bilateral Tariff Reductions

Proponents of regional free trade agreements have cited the benefits from economies of large-scale production as a major gain to the member

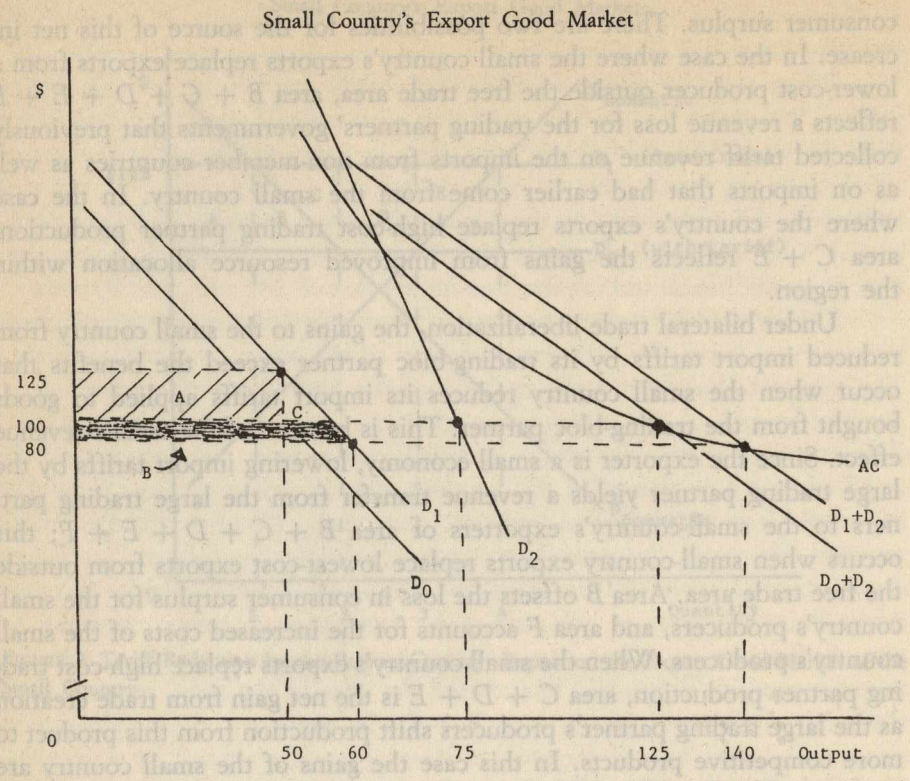

FIGURE 3. Tariff Reduction by the Partner Country When There Exist Economies of Large-Scale Production: Impact on the Export Good Market of the Small Country *

* D_0 denotes the trade partner's demand schedule with a tariff
D_1 denotes the trade partner's demand schedule without a tariff
D_2 denotes the small-country's demand schedule

countries. When the domestic economy is too small to support efficient-scale manufactures, sizable efficiency gains can result from international trade. As seen in Figure 3, as the foreign trading partner reduces its import tariff, there occurs an increase in demand for home-country exports. This is seen by the demand for home-country exports becoming D_1 instead of D_0, which results in the total demand shifting from $D_0 + D_2$ to $D_1 + D_2$. The increase in demand permits longer production runs and lower unit costs as reflected in the downward-sloping average cost curve of the domestic producers, denoted by AC. For simplicity, the analysis assumes that the domestic producers price the product at average cost. Admittedly, the existence of

economies of scale over the entire range of production would result in market power for the producer. The seller would then set a price at the output level where marginal revenue equals marginal cost rather than setting price equal to average cost as is assumed in Figure 3. In such a case, the benefits of economies of scale would not all be passed on as lower costs to the consumer but would partially be appropriated as higher monopoly profits by the producer.

The consumers of the foreign country, who reduced its tariff, will gain added consumers surplus on the imports from the exporting country as shown by area $A + B + C$. Area A is a transfer from tariff revenue from the foreign government to the foreign consumer. Areas $B + C$ are net consumer gains from the added trade at lower costs of production.

Economies of large-scale production also yield benefits for consumers in the exporting country. Figure 4 suggests that with added production caused by trade liberalization abroad, domestic consumers also can purchase the product at a reduction in price of $20 per unit. This price reduction results in an increase in consumer surplus shown by solidly-shaded area D.

Access to the larger free-trade-area market also provides an opportunity for domestic producers. By cutting back on product line and specializing in a particular good, producers are able to slide down their average cost schedules and achieve lower unit costs. This permits lower prices and expanded sales in the domestic market and foreign market. For domestic consumers, the lower price results in an increase in consumer surplus for this product. Moreover, the domestic consumer will be able to capture similar welfare gains on other products being imported at lower prices from other members of the free trade area that are also enjoying economies of scale with their expanded production. *Unlike* the situation of Figure 1, the gain to the domestic consumer does *not* come at the expense of the domestic producer nor, as in the situation of Figure 2, at the expense of the trading partner.

The economies-of-scale approach has further implications for the producing country. As increased production results in lower unit cost, the competitiveness of domestic producers will be enhanced in third-country markets. Some of the advantages of expanded bilateral trade will thus be similar to the advantages of free multilateral trade. This has been reflected in the development of the concept of "external trade creation" from regional integration. This is a measure of the increase in trade with non-partner countries resulting from the effects of regional integration.

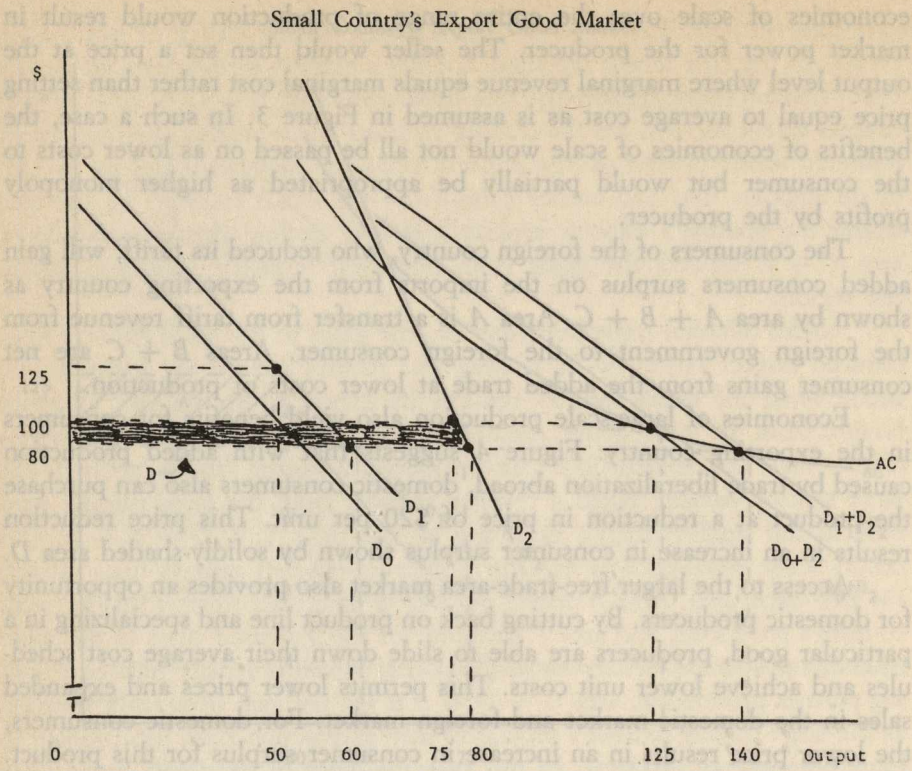

FIGURE 4. Tariff Reduction by the Partner Country When There Exist Economies of Large-Scale Production: Impact on the Small-Country Consumer *

* D_0 denotes the trade partner's demand schedule with a tariff
D_1 denotes the trade partner's demand schedule without a tariff
D_2 denotes the small-country's demand schedule

Empirical Estimates and Projections

There exists widespread, though not universal, recognition that trade liberalization benefits all countries involved: it is not a zero sum game where one country benefits at the expense of another. Proponents of the U.S.-Canada Free Trade Agreement maintained that the benefits of free trade operate through several channels: (1) traditional comparative advantage and specialization; (2) economies of scale; (3) reduced uncertainty and more secure markets; (4) increases in economic growth. In an attempt to

evaluate these arguments, it will be instructive to review the empirical studies of the effects of the early trade liberalization in the EEC as well as studies that have been conducted to project the effects of the U.S.-Canada Agreement.

European Economic Community Experience

In the early studies of the effects of trade liberalization in the EEC, emphasis was placed on the trade creation and trade diversion effects without isolating the contribution resulting from economies of scale. In the review of these early studies by Balassa [5], he found there was general agreement in the results showing trade creation exceeding trade diversion by at least four times. The studies under review had used various techniques to compare the values of trade of the EEC countries about ten years after its establishment to the value that would have been projected based on trade in the 1950's before integration.

Although the level of statistical significance in the studies was not high, the results fit quite well with economists' expectations based on the changes that had taken place in the European economies. The Common Agricultural Policy had led to significant trade diversion while trade in manufactured products exhibited limited trade diversion and significant trade creation. The results were much more positive than the pessimistic projections of critics of the EEC, as quoted earlier in the paper.

But over the period of ten years of regional European integration, there emerged growing recognition that an important impact of the process was showing up in increasing intra-industry trade rather than the increased inter-industry trade of static trade theory. This led Balassa [6] to make some early estimates of the way in which increased specialization in differentiated products could contribute to improved welfare for the countries' economies. He concluded that "the benefits derived from economies of scale, the rationalization of production, and increased investment activity far overshadow the static gains and losses associated with trade creation and trade diversion in the Common Market" [7].

In a more recent study of the economic effects of regional integration in Europe, Nicholas Owen [8] pointed out that "customs union theory attri-

[5] Balassa (1975).
[6] Balassa (1975, pp. 108-112).
[7] Balassa (1975, p. 116).
[8] Owen (1983, p. 141).

butes very little benefit to this additional trade" (stimulated by integration). However, he uses a study of three specific manufacturing industries to evaluate the benefits of economies of scale that have occurred in those industries as a result of increased intra-industry trade. Owen estimates that the dynamic benefits to the original six members of the EEC amounted to 3-7 percent of gross domestic product by 1980 [9]. This is far greater than any estimates of static effects of integration. In addition, the increase in intra-industry trade leads to the conclusion that "it need not involve any movement of resources in either country" [10]. It would appear that the dire consequences of resource redeployment, that had been forecast by Coppola d'Anna, have not been seen in Europe. Despite considerable structural change caused by the increase in intra-industry trade, unemployment rates fell significantly during the first twenty years of integration.

Projections of the Effects of the U.S.-Canada Free Trade Agreement

A number of empirical studies have been conducted on the expected economic effects of free trade between Canada and the United States. Table 1 summarizes estimates of the permanent, long-run impacts (i.e., when the

TABLE 1.

RECENT STUDIES OF THE LONG-RUN ECONOMIC EFFECTS OF THE U.S.-CANADA FREE TRADE AGREEMENT: IMPACTS ON CANADA

Empirical Study	Percentage Change in Real Income
Canadian Department of Finance	2.5%
Hamilton-Whalley	0.7
Economic Council of Canada	3.3
Informetrica	3.0
Institute for Policy Analysis	3.3
Wharton Econometrics	3.1

Source: Canadian Department of Finance, *The Canada-U.S. Free Trade Agreement: An Economic Assessment*, Ottawa, Ontario, p. 32.

[9] OWEN (1983, p. 155).
[10] OWEN (1983, p. 151).

policy change has been implemented and the structure of the economy has fully adapted to it) of the U.S.-Canada Free Trade Agreement on the Canadian economy when economies of scale are taken into account. The studies included in the table conclude that bilateral free trade with the United States will raise Canada's real income within the range of 1 percent to just over 3 percent above levels without the agreement. There have been fewer studies of the effect of the agreement on the United States' economy, in part because U.S.-Canada trade is of less importance relative to the total economy for the United States than it is for Canada. However, the *Economic Report of the President, 1988* reports that studies show the absolute dollar benefits to the U.S. economy will be as great as for the Canadian economy [11].

The benefits of greater economies of scale through integration of the North American economy would seem to have the potential to be even greater for Canada. As seen in Table 2, the earlier trade policies of Canada had resulted in many Canadian producers with a large number of small plants that produce too many different products in short, fragmented production runs. There was growing awareness among Canadian business leaders, academics, and politicians of how difficult it is for Canadian manufacturers to achieve large-scale production without assured access to a large market. The idea that high import tariffs are an important reason for short, inefficient production runs in Canada has been empirically investigated. One study found that Canadian industries with high tariffs and high concentration have shorter production runs and greater product diversity than elsewhere in the manufacturing sector. The study also found that larger Canadian plants were small compared to larger U.S. plants, but that Canadian plant size increased by about one-third between 1970 and 1979 when significant tariff cuts were occurring. Moreover, the length of the production runs increased as tariffs were reduced, and product diversity within plants decreased [12].

Additional empirical analysis, conducted by Harris and Cox, places more emphasis on the effects of the rationalization of production with significant economies of scale [13]. Their study projects Canadian income growth of as much as 9 percent following the implementation of the free trade pact. Their model, based on a general equilibrium model of the Canadian economy that takes into consideration the measures of economies of scale that have been found in Canadian industry and the resulting imperfect

[11] *Economic Report of the President, 1988*, (1988, p. 131).

[12] EASTMAN and STYKILT (1967).

[13] HARRIS and COX (1985).

TABLE 2
AVERAGE SHIPMENTS PER ESTABLISHMENT, 1982 (MILLIONS OF U.S. DOLLARS)

	United States	Canada
All Manufacturing	6.5	4.2
Food and Kindred Products	12.7	6.1
Tobacco Manufactures	98.5	50.4
Textile Mill Products	7.2	3.6
Apparel and Other Textile Products	2.2	1.5
Lumber and Wood Products	1.3	1.7
Furniture and Fixtures	2.4	.8
Paper and Allied Products	12.5	15.5
Printing and Publishing	1.6	1.2
Chemicals and Allied Products	14.3	9.3
Petroleum and Coal Products	90.0	140.8
Rubber and Miscellaneous Plastics Products	4.1	3.5
Leather and Leather Products	3.6	2.1
Primary Metal Industries	14.8	22.5
Fabricated Metal Products	3.4	1.9
Machinery, except Electrical	3.6	3.7
Electric and Electronic Equipment	9.0	6.3
Transportation Equipment	21.3	15.2

Source: U.S. Bureau of the Census, *1982 Census of Manufactures* and Statistic Canada, *Canada Yearbook, 1985.*

market pricing, shows much greater possible gains from these economies.

Conclusion

The impact of the U.S.-Canada Free Trade Agreement will also be seen in its reductions of non-tariff barriers to trade of goods and services that are not considered here. But the economic evaluations have followed quite closely from the experience of the integration process in Europe.

Most studies have downplayed the possible problems of dislocation of labor in Canada, although some opponents to the pact have suggested this as a potential problem. The evidence in Europe, where this was an early concern, would seem to support this reduced concern. In a similar manner, the empirical studies have followed recent theoretical analyses of the EEC

on emphasizing the effects of reduced costs due to economies of scale and rationalization of production over the effects of trade creation and trade diversion. This is supported by the theoretical models that demonstrate that economies of scale can benefit both trading partners while the static effects of trade creation and trade diversion create offsetting effects.

The history of free trade in Europe, and the studies that consider the effect of free trade between the United States and Canada, seem to be optimistic. It will now be a process of watching the next ten years to see if the countries maintain the political will to carry through with the pact's provisions and to determine whether this optimism is justified.

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L'ESPERIENZA DELLA CRESCITA DEGLI SCAMBI COMMERCIALI NELLA COMUNITÀ EUROPEA E IMPLICAZIONI PER L'ACCORDO DI LIBERO SCAMBIO TRA STATI UNITI E CANADA

Il dibattito relativo alla ratifica dell'accordo di libero scambio tra Stati Uniti e Canada del 1989 è simile alle questioni economiche che furono dibattute al tempo dell'istituzione della Comunità Economica Europea negli anni cinquanta. Questo articolo traccia la storia dei primi sviluppi dell'integrazione regionale nella Comunità Economica Europea e determina se le preoccupazioni espresse a quel tempo aiutano a capire le diverse opinioni sugli effetti previsti dell'accordo di libero scambio tra Stati Uniti e Canada.

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LONG RUN FACTORS IN OIL PRICE FORMATION

by
SANDRO FURLAN *

Introduction

The purpose of this paper is to discuss some of the factors that are crucial in the determination of long run international petroleum prices, to explore what impact these factors might have, and to clarify whether the price formation process in petroleum differs significantly from that in other primary commodity markets. The time horizon of the study is the next 2-3 decades. In section 2., 3., 4. and 5. we explore, in turn, the roles of: (*a*) exhaustibility; (*b*) monopolistic forces; (*c*) inter-fuel substitution; (*d*) future technological shocks and environmental constraints represented here by the possibility of a moratorium on nuclear power, or of severe restrictions on carbondioxide emissions. However, in order to provide a broader context, and a historical perspective on the subject, section 1. reviews the prices of petroleum and other primary commodities since the beginning of the present century.

1. *The Historical Evidence of Prices: Oil and Other Primary Commodities*

Figure 1. depicts indices of real prices between 1990 and 1986 for oil, metal and minerals, non-food agricultural commodities and food commodities [1].

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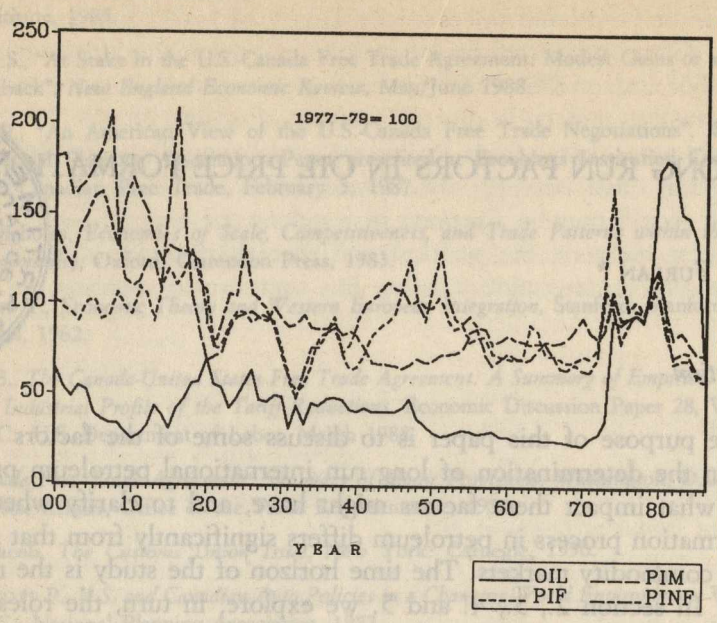
[1] Nominal oil prices have been obtained by splicing three different series, (*a*) 1900-1947: US adjusted average prices at well-head (MANTHY, 1978, table MP-3); (*b*) 1948-83: Posted Saudi Arabian Light crude prices. Data for 1948 and 1949 are from ADELMAN (1972, table

FIGURE 1. Real price indexes for: oil, food, metals, agricultural nonfood materials



An ocular inspection of the oil price developments reveals a gentle downward slope beginning after the first world war, and ending in the early 1970s, when, in the view of a majority of economists (Gately, 1984) [2], the OPEC "cartel" drove up prices to historically unprecedent levels. The slow downward slope is interrupted by a much steeper temporary decline in the latter half of the 1940s, caused by the opening of the rich Middle East oil resources on a large scale. The exports from this region rose from 4.5 million tons, 9% of the global total in 1938, to 51.6 million tons and 37% in 1950 (Darmstadter, 1975).

V-1). Data for 1950-83 are from WORLD BANK (1986); and (*c*) 1984-86: North Sea crude, spot quotations. The figure for 1984 refers to oil from the Forties field, as given in *BP Statistical Review of World Energy* (1988). The figures for 1985 and 1986 are for Brent oil, as given in *OPEC Bulletin* (1986). All other nominal commodity price indexes, as well as the deflator to calculate real prices (the US index of wholesale prices of manufactures) have been obtained from GRILLI and YANG (1988).

[2] The question if OPEC has operated as a classic cartel is still controversial; see also: MIKDASHI (1975), SMART (1975), ADELMAN (1972), SINGER (1983), ROBINSON (1984), PENROSE (1984).

Comparison with other commodities reveals a considerable short run stability in the petroleum prices over a large part of the period studied, as compared to the price indexes of major non-oil commodity groups. This could be because of the peculiarities of the oil price quotation or of the market structure characterising oil. The posted Saudi crude price has been used in the graph between 1948 and 1983. In the 1950s and 1960s, this quotation was changed very infrequently. It is quite likely, however, that the smoothness has other explanations, and would have remained even if other price series were employed. Between the 1930s and the 1970s, the oil market was dominated by an oligopoly of multinational firms, and, as is typical for such market structure (Scherer, 1980, p. 100), there was a considerable reluctance among its members to change prices at frequent intervals.

An important issue that has to be illuminated is whether the long run trend in real oil prices deviates in any important way from the trends exhibited by other major commodity groups. Oil being an exhaustible resource one might expect its price to move up over time, in relation to renewable raw materials.

The estimated semilog model is $\ln P_i = a + bt_i + u_i$ where P is the deflated commodity price [3], t is the time trend, and u the error term. To avoid the very strong distortions caused by the OPEC cartel, the regression cover only the 1900-1972 period. In addition to (*a*) *oil*, regressions have been run for (*b*) *food commodities*, (*c*) *nonfood agricultural commodities*, and (*d*) *metals*. Furthermore, the food group has been subdivided into (*e*) *tropical beverages*, and (*f*) *nonbeverage food*.

Obviously, first-order serial correlation was to be consistently present in all the estimated time regressions. We corrected for it using a Maximum-likelihood procedure. The time coefficients of the regression models in their corrected version (shown in Table 1.) maintain statistical significance, whereas the R^2, the standard error of the estimate (*SEE*), the F, and Durbin-Watson (*DW*) statistics of the regressions improve substantially with respect to the result obtained from the regressions uncorrected for serial correlation.

All the major commodity groups have recorded trend declines in their

[3] The question that arises is the worrisome quality bias regarding the USMPI (US Manufacturing Price Index) used as deflator. The quality bias has two dimensions. The first has to do with the rate of increase in the number of new manufactured products entering trade, causing changes in the internal composition of the various commodity groups over time. The second has to do with the direct improvement in the quality of the same goods whose prices are measured over time (GRILLI and YANG 1988, p. 33). It seems better to compare the price series simply and to show that the oil price has not increased relatively to the other renewable commodities.

TABLE 1
RESULTS OF REGRESSION OF DEFLATED COMMODITY PRICES ON TIME
1900-1972[a]

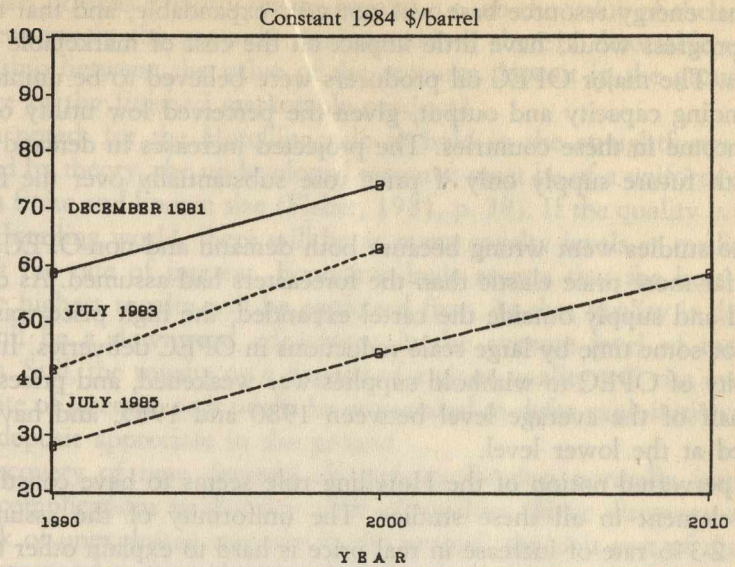
Relative price index	Intercept	Time Coeff.	Regression Statistics			
	(*a*)	(*b*)	R^2	*SEE*	*F*	*DW*
ln (OIL/USMPI)	3.96	− 0.0093	0.70	0.14	168.79	2.11
	(29.02)	(− 2.98)				
ln (GYCPIF/USMPI)	4.62	− 0.0043	0.81	0.11	317.52	1.49
	(46.55)	(− 1.89)				
ln (GYCPINF/USMPI)	4.93	− 0.0094	0.81	0.11	312.56	1.54
	(37.78)	(− 3.18)				
ln (GYCPIM/USMPI)	4.98	− 0.0112	0.82	0.12	313.67	1.38
	(33.27)	(− 3.32)				
ln (GYCPIBEV/USMPI)	3.55	+ 0.0039	0.57	0.15	95.93	1.80
	(20.02)	(0.95)				
ln (GYCPIOF/USMPI)	4.84	− 0.0057	0.81	0.12	304.46	1.50
	(46.00)	(− 2.35)				

[a] GYCPIF, GYCPINF, GYCPIM, GYCPIBEV, GYCPIOF, = Grilli and Yang index of prices of food, nonfood agricultural raw materials, metals, tropical beverages, and nonbeverage food. USMPI = US Manufacturing Price Index. See GRILLI and YANG (1988); *t* values in parentheses. OLS estimates are based on annual data. A Maximum-Likelihood procedure was used to correct for serial correlation: See BEACH and MACKINNON (1978).

real prices over the period covered by the regressions. The metals index exhibits the sharpest decline, a full 1.1% per year while the average price fall for the food index is only 0.43%. One can surmise that an expanded geographical spread of primary commodity production, along with increasing productivity of labour, and of the natural resources used in commodity production, have permitted producers to reduce costs, despite the manifold increases in the volume of output recorded during the period. A further subdivision of the food index yields the only instance of rising real prices: 0.39% per year for the tropical beverages group.

Oil does not appear exceptional in our comparisons with other commodities. The trend price decrease recorded for oil, 0.93% per year, emerges as neither particularly high or especially low. In this respect, the developments in the oil market are not different from those that occurred in other major commodity markets.

FIGURE 2. Consensus of oil price forecasts made in 1981, 1983 and 1985



Source: International Energy Workshop of IIASA, 1985.

2. *The Role of Exhaustibility for Petroleum Prices*

In 1980, the oil prices were approaching their peak, after an historically unprecedent tripling in real terms in the early 70's, followed by a further doubling towards the end of the decade. At that time, there was a virtual unanimity among economic analysts and policy makers that oil prices would continue to rise over the rest of the century, and possibly beyond, by some 2-3% per year in real terms [4]. This view persisted into the mid-80's, despite substantial price falls after 1981. The consensus of oil price forecasts, compiled by the International Energy Workshop at IIASA in 1981, 1983 and 1985 continued to indicate rising real petroleum prices to 1990 and 2000, running in parallel, but at successively lower levels, due to the declining starting points in the forecast exercises (See Figure 2).

Retrospectively it is evident that these forecasts went monumentally wrong. Common to them all was a belief that the demand and supply

[4] EXXON (1980); WORLD BANK (1981).

responses to changing energy prices would be very slow and very small, that the global energy resource base was not very expandable, and that technological progress would have little impact on the cost of marketable energy products. The major OPEC oil producers were believed to be uninterested in expanding capacity and output, given the perceived low utility of additional income in these countries. The projected increases in demand would tally with future supply only if price rose substantially over the forecast period.

The studies went wrong because both demand and non-OPEC supply proved far more price elastic than the forecasters had assumed. As demand declined and supply outside the cartel expanded, the high price was maintained for some time by large scale reductions in OPEC deliveries. In 1986, the ability of OPEC to withhold supplies was weakened, and prices fell to about half of the average level between 1980 and 1985, and have since remained at the lower level.

A perverted notion of the Hotelling rule seems to have constituted a crucial element in all these studies. The uniformity of the assumptions about a 2-3% rate of increase in real price is hard to explain other than by the perception that the price of oil, an exhaustible resource, must appreciate by the real rate of interest. Once the price path was set with the help of Hotelling, the oil forecasters adjusted their analysis of future demand and supply, to vindicate that the price path was needed to assure market equilibrium.

Using Hotelling in this way was a misconception. The exhaustible resource theory claims that in an environment of utility and profit maximizing agents who use an unchanging technology to exploit a natural resource from a given and uniform stock, the value of a unit of that unexploited resource, i.e. the royalty, will rise at the rate of interest (Hotelling, 1931). The relationship is commonly referred to as the Hotelling rule.

The following analysis concludes that the rule applies only to very special circumstances which are seldom encountered in the real world. In addition, it is argued that those who used the Hotelling rule as a guide to petroleum price developments made an unwarranted jump in their analysis, from the price of the resources in the ground to the price of the extracted product in the market. It will be shown below that the prices of the two need not move in parallel.

Given the fundamental role the theory of resource exhaustion appears to have played in the faulty forecasts, it is important to ask what, if any, relationship can be established between the exhaustible nature of oil on the one hand, and price formation in the oil market, on the other.

The discussion can instructively be divided into two seps. First, what is the impact of exhaustibility on the royalty, i.e. on the value of the undeveloped resource in the ground? And second, is there a detectable uniform relationship between the value of the resource deposit in the ground, and the price of the finished marketable product?

As noted, for the Hotelling rule to hold in the straightforward way indicated by theory, the undeveloped resource must be of a uniform quality, and of a finite and known size (Fisher, 1981, p. 39). If the quality is uneven in the Hotelling world, there will be as many royalty levels as qualities, all rising at the rate of interest. Economic logic asserts that the best quality with the highest royalty will be exploited first. As that quality is depleted, there will be a downward adjustment in the average level of the rising royalties. Still, the royalty on a deposit of a given quality will rise over time at the rate of interest, so it might be economical to defer exploitation and let such a deposit appreciate in the ground.

Discovery of new deposits through exploration normally introduces further complications to the time path of royalties. Since discovery adds to the stock of unexploited resource in the ground, the unit cost of discovery must correspond to the unit value of that resource, i.e. to the royalty. If the royalty rises at the rate of interest, the correspondence will be maintained only if the cost of discovery increases in equal measure. This obviously holds in the real world only in exceptional cases. It is hard to model the rate at which discoveries are made and the cost involved. From time to time there are unanticipated breakthroughs in discovery, when a given exploration expenditure results in massive finds. The gradual unfolding of the massive oil deposits in the Middle East in the 1940s is an example of such a spurt. The cost of discovery then falls, and so does the royalty in consequence. Hence, the Hotelling rule breaks down. With unanticipated discovery, even the assertion that the royalty on a deposit of a given quality rises at the rate of interest, will cease to hold.

A further doubt about the validity of the Hotelling rule arises when technological improvements are introduced. These work in several ways. Consider first the technology of exploration. With unchanged technology one could premise that the cost of discovery will rise over time on the Ricardian argument that it is necessary gradually to move exploration to less promising territories. In this scheme of things, spurts in discovery can be regarded as ad hoc aberrations whose impact even out in the long run. These premises cease to hold when technological progress is introduced. With improvements in exploration technology, the unit cost of discovery of a given quality deposit need not rise at all, and may even fall over time.

Consider second the technology of exploration. Technological progress can lead to wholesale shifts in the cost of exploiting different kinds of deposits, changing the quality ranking among them, and invalidating the theoretical uniform percentage increases in royalties over time. At the turn of the century the highest quality deposits of copper consisted of small high-grade veins; the best iron ore deposits were the ones located close to the steel mills. Technological breakthroughs in mass mining methods and in bulk transport made it much more economical to extract copper from more meagre but much larger sulphide deposits, and iron ore from landscapes of high-grade ores in faraway places like Brazil and Australia. The royalty on the most valued deposits of earlier times fell to zero; the royalty on the deposits exploited in more recent times has not grown perceptibly, because of the huge discoveries in past decades.

The above analysis indicates that any relationship between the value of exhaustible resources in the ground, and the rate of interest, is tenuous and unstable. Hence, it is not surprising that we lack empirical observations confirming that royalties on exhaustible resource deposits rise at the rate of interest over extended periods of time.

The second step in the analysis, i.e. the establishment of a relationship between the royalty on the one end, and the finished natural resource product, on the other, may seem superfluous, if no meaningful time-path for royalties can be established. It suffices to note that cost-reducing change in the technology of exploitation can compensate or even over-compensate for any systematic cost increases due to rising royalties or augmenting cost of discovery. Judging from the negative trends in the long run prices of exhaustible resource products in the course of the present century, such over-compensation must have been common.

It may now be instructive to recapitulate. In a realistically formulated theoretical world, the Hotelling rule, where the price of the resource in the ground rises at the rate of interest, emerges as a very special, not a general case. In the real world, we have no empirical evidence of unexploited exhaustible resource price systematically rising at the rate of interest. The evidence suggests that exploited exhaustible resource materials, like crude oil, experience gently falling price trends. What conclusion, if any, can be drawn from this about the role of exhaustibility for petroleum?

From past history we can conclude that technological progress, coupled possibly with luck in exploration, has overwhelmed any impact that exhaustibility and depletion may have had on crude prices. For the future, a case can clearly be constructed where the cost of discovery rises, not necessarily by the rate of interest, but by more than the technologically induced reduc-

tion in the cost of exploitation. If these conditions persist, the rising royalty will push the costs and prices of crude oil upwards over time. But this is only one of several possible scenarios, and it is not supported by the evidence from the past. Another, equally likely scenario for the very long run is that the fate of oil will follow that of European coal in the course of the present century: the emergence of superior substitutes will diminish the demand for oil, and suppress the need for additional discovery. Instead of rising continuously, and pushing prices upwards, royalties will then shrink into insignificance.

In conclusion, therefore, it does not seem possible to establish unambiguously whether exhaustibility and depletion will have any perceptible impact on petroleum price in the coming two to three decades with which this paper is concerned.

3. *The Monopolistic Elements in the Petroleum Market*

The present section takes a look at the petroleum market in isolation, and explores the scope for producers to reap monopolistic profits by managing supply. The focus of attention is on the long run. In the following section, the vista is widened, and the price formation in the oil market, competitive or monopolistic, is related to the price developments of substitute products.

1985 marked the end of a 12-year period of very high oil prices. Early in 1986, the price of petroleum (North Sea Brent) declined by almost 50% to about $ 14 per barrel [5]. Measured in other major currencies like the Yen or DM, the fall was even greater and exceeded 60%. Since then, the price variations have been considerable, but the average has barely exceeded $ 15.

The common view after the price had fallen was that the cartel had collapsed. A more careful look at the circumstances characterising the oil market after 1985 indicates that this was not the case at all. Leaving aside the controversy whether OPEC acted as a cartel in 1973-74 and in 1979-80 (Gately, 1984), it suffices to note that the OPEC members have kept 8-10 Mb/d, almost one third of their total production capacity, inactive during 1986-1988. Most of this capacity had variable costs below those of major non-OPEC producers, e.g. those operating in the USA and in the North Sea.

[5] Spot Crude Oil Prices: Saudi Arabian Light 34.0 API March 1985 equal to $/b 27.81 (5w Av.), March 1986 equal to $/b 13.13 (4w Av.); North Sea Brent 37.4 API March 1985 equal to $/b 28.28 March 1986 equal to $/b 14.25. Data from *OPEC Bulletin* (1986).

The latter had no economic incentive to close down existing operations on any large scale unless prices fell below $ 5 per barrel (Adelman, 1986b).

Without the supply restraint exercised by OPEC in the 1986-88 period, price would therefore have settled at $ 5 or below, instead of the $ 17-18 average that has actually prevailed. OPEC would have been producing at its full capacity of almost 30 Mb/d, with the non-OPEC output sharply reduced, to assure equilibrium between sypply and demand. In any historical perspective, a commodity producer group which succeeded in witholding one third of its supply capacity, thereby raising prices to three times the competitive market level, would be deemed an extraordinary successful cartel.

In a short- to medium-term perspective stretching into the mid-1990's, the monopolistic elements of the international petroleum market hinge on the relatively low price elasticity of demand, the heavy concentration of petroleum supply available for exports, and the preparedness to collaborate, developed among the OPEC producers over the past decades.

The concentration of actual and readily available potential export supply of petroleum is depicted in Table 2. The six Middle-East OPEC countries accounted for more than half of the actual surplus of production over consumption from major exporting areas. The cartel aggregate of 13 countries generated almost three quarters of the total.

The importance of OPEC emerges even more starkly when the potential surplus of capacity over consumption is considered. Admittedly, the capacity data are uncertain and vague. But while Mexico, the UK, Norway and the Socialist Countries operated close to their capacity limits, the mem-

TABLE 2

PRODUCTION AND CAPACITY TO SUPPLY PETROLEUM IN EXCESS OF DOMESTIC REQUIREMENTS BY SOME EXPORTING COUNTRIES AND TOTAL OPEC IN THE 1989-II QUARTER (Mb/d)

	Production	Capacity to supply	Domestic requirements
Saudi Arabia	5.36	8.80	0.96
Iran	2.75	3.00	0.83
Iraq	2.74	2.80	0.33
Kuwait	2.39	3.10	0.17
Total OPEC	22.97	27.50	3.90

Source: *OPEC Facts and Figures* (1990); *Petroleum Economist* (1989)

bers of the OPEC cartel have for a number of years carried a huge excess capacity from which additional surpluses could be generated. With relatively short notice, the OPEC countries could increase their export surplus to 25 Mb/d, thus providing more than 80% of the global total.

These figures demonstrate the power that the cartel wields in the international petroleum market. While OPEC's share in world production has been reduced in the past decade to a third [6], most non-OPEC oil is domestically consumed, and the cartel continues to hold a very dominant position in the exported supply. This position is used to reap huge monopoly profits for the cartel members.

How lasting is OPEC's or its Middle East members' market power? That depends on the degree of ambition in the cartel's market management. The high prices that prevailed between 1974 and 1985 created incentives for a fast expansion of capacity and output outside OPEC in the non-Socialist world. That output remained stagnant for a number of years, but started to rise, with a lag, in response to the higher prices. Between 1976 and 1985, non-OPEC supply outside the Socialist Countries rose by 55%, or from 16.3 to 25.3 Mb/d [7]. This expansion diluted the cartel's market power. In order to defend the price levels of the early 1980s, the cartel had to reduce its output, from 31.5 Mb/d in 1979, to 17.2 Mb/d in 1985. With falling demand for their output, there was no incentive to expand capacity within the OPEC countries. In fact, neglect to maintain existing installations may have resulted in some capacity shrinkage.

It is probable that a prolonged defense of the 1980-1985 price level would have led to continued growth of non-OPEC supply. Together with shrinking demand, this would have further reduced OPEC's market share, ultimately making the high price policy uneconomical to the cartel even in the short run.

After the prices fell in early 1986, the non-OPEC supply has ceased to grow, and demand expansion resumed, thus providing a widened scope for OPEC sales, increasing both the absolute volume and the market share of the cartel.

The time period since the price fall is far too short to permit any conclusion about definite trend reversals. Nevertheless, a continuation of the tendencies that have emerged after 1985 will result in a gradual increase in OPEC's utilization of existing capacity. If that capacity remains unchanged,

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[6] 1988 (IIQ) Crude Oil Production: 33.2 Mb/d. Data from INTERNATIONAL ENERGY AGENCY (1988).

[7] See: *BP Statistical Review of World Energy* (1975-1986).

the need for supply management will dwindle, and disappear completely, maybe towards the end of the century, when full capacity utilization by OPEC members becomes consistent with the $ 18 price. Without supply management, one could then talk about a competitive market in which OPEC production is intramarginal and reaps substantial rents on account of its superior resource base.

The notion about a competitive market, brought up in the preceding paragraph, hinges on the assumption about constant OPEC capacity. When that assumption is relaxed, and capacity is permitted to change, competition among profit maximizing agents implies that capacity should increase through investments in the most economical deposits, until the expanded production has driven prices down to a level where additional investments yield no more than the normal capital return.

As already noted, the investment behaviour in the petroleum market over the past 15 years, has been very different from what one would expect in competitive market. In the late 1970s, the total incremental cost to produce an additional barrel per day was about $ 8 in the USA, but less than $ 0.15 in Saudi Arabia (Adelman, 1986a). Yet, a lot of investment activity took place in the USA, and hardly any in Saudi Arabia. In 1985, an average of 963 oil rigs were operated in Texas and Louisiana in the United States. In Saudi Arabia, with about the same surface, but a vastly superior potential, only ten rigs were in place (Adelman, 1986b). In 1985, the whole of OPEC operated no more than 290 rigs. By 1987, the number had fallen to 186. This was only 7.5% of all the rigs operated in the non-Socialist word. Yet, more than 80% of the non-Socialist world oil reserves were located in OPEC countries [8].

More to the point, the cost to establish and maintain oil production capacity varies enormously, not only between the USA and Saudi Arabia, but among all oil producing countries. Adelman reckons that a price of around $ 20 (1985 $) would be needed to sustain the current non-Socialist world production levels outside OPEC in the long run (Adelman, 1986b). His calculations, based on conservative assumptions about the currently identified petroleum reserves, also show that within a ten-year period, five OPEC members in the Middle East (Iraq, Iran, Kuwait, Qatar and Saudi Arabia) could establish and operate profitably a lasting capacity of 49 Mb/d, at prices below $ 1 (1985) per barrel. The whole of OPEC could create a sustainable and profitable capacity of 64 Mb/d at prices of $ 5 (1985). This can be compared with the 1987 capacity of 19 Mb in the Middle East, and

[8] See: *OPEC Facts and Figures* (1988).

29 Mb for all OPEC, or with production, amounting to 13 million in the Middle East and 19.30 Mb in the whole of OPEC, or with the entire non-Socialist world output in that year, of 44.41 Mb/d.

The unwillingness of the OPEC countries to use their extraordinary resource potential for expanding production capacity after the mid-1970s has been an important, although not binding, component of the cartel's policies to manage supply.

Adelman's figures show that in a competitive petroleum market, the huge Middle East resource potential would suffice as the only source for capacity expansion over a very long period of time. They also indicate that in competitive market conditions, much of the USA and North Sea capacity would be forced to close prematurely, because a brisk and highly profitable expansion in OPEC countries would keep prices below the variable costs in North America and Europe.

The exceedingly uneven quality and geographical concentration of oil deposits provides great scope for profitable monopolistic coordination in the long run, through restricted access to the rich parts of the resource base for capacity expansion. Psychologically, the management of long run supply through investment restraints is probably easier to accomplish than management of supply in the shorter run through cuts of production from existing capacity. The former merely involves deferral of decision about the future, while the latter requires immediate and highly visible action.

The present paper does not provide scope for the complex investigation to determine the extent of profitable monopolistic market power of those who control the rich petroleum resources. It suffices to state that their profits will be raised by long run restrictions in supply that push prices substantially above the $ 5 (1985) or less, that could be expected with competitive market behaviour. It can be conjectured that at these higher price levels (maybe $ 10-12 in constant 1985 $) the long run price elasticity of demand is substantially below absolute 1. Hence, maximization of profit or revenue by the owners of the rich resources will make a significant non-OPEC output profitable too.

Neither does the paper provide scope for clarifying the precise nature of the objective function that the members of the long run cartel would pursue, nor for resolving the institutional issues that such collaboration would involve. There is no believable model of OPEC behaviour even for the past (Gately, 1984) but this does not imply that long-run collaboration will be difficult to establish. Public control of petroleum production in OPEC countries limits the number of decision making units that need to be involved, thus facilitating the management of investments. A historical expe-

rience worth noting in this context is that where the external market preconditions for monopolistic profits exist, they will also be utilized by the suppliers, irrespective of prevailing institutional relationships (Mackie-Mason and Pindyck, 1986).

The simple conclusion emerging from the analysis of this section is that monopolistic forces are likely to influence petroleum prices also in the long run, stretching a decade or two into the next century. The reason is the very skewed petroleum resource base which provides scope for monopolistic profits through restrained supply. In this respect, the petroleum market is unusual. Most other commodity markets offer little scope for profitable monopolistic coordination over extended periods of time. The potential degree and power of monopolistic coordination therefore warrants careful consideration in long run analyses of petroleum prices.

4. *Interfuel Substitution and Petroleum Prices*

The possible emergence of competitive substitutes for oil could dampen oil price developments, and impose a constraint on the monopolistic power of the countries richly endowed with oil resources.

Undoubtedly, the emergence of oil as a major source of energy in the 1930s, when it first exceeded 20% of global primary energy consumption (Darmstadter, 1975), and the fast growth in its share of the total to over 40% during the following four decades, imposed an effective cap on the price of coal. One can say that in the absence of competition from oil, coal prices would have been substantially above their actual record over this period. Since oil could conceivably encounter similar competition in future decades, with its price kept down by the emergence of alternative energy sources, it is important to explore the mechanics of the process, and the preconditions and likelihood for it to occur.

The impact of relative prices on inter-fuel substitution is quite tricky to disentangle; the recursive impact of substitution on prices is even trickier. The following analysis deals mainly with the second issue.

In approaching the subject, we have first to consider the relative price between oil and the substitute energy raw material, say steam coal, which assures both materials an unchanging share of the total energy market. The international share of oil was expanding, that of coal contracting in the 1960s, when oil and coal had roughly the same price per unit of energy [9].

[9] The record of coal prices in that period is blurred. The price equivalence emerging in

The reverse was true between 1974 and 1985, when coal could be had at a discount to oil of more than 50%, measuring in energy equivalents [10].

Somewhere in between, maybe at an oil/coal price ratio of 2 : 1 (expressed in energy equivalents), a competitive neutrality will occur. The competitive advantage of oil over coal in certain markets (transport fuels) will then be balanced by its competitive disadvantage in others (electricity generation), so that the overall market share of each remains constant. In practice, this neutrality is hard to determine, and even harder to observe, because of quality differentials in each material, because transport costs will result in shifting price ratios in different geographical areas, and because technical change will affect the relative competitiveness of the two materials over time.

Abstracting from these ambiguities, we may conclude that the higher the actual price ratio is above the competitive neutrality level, the greater will be the pressures to substitute oil for coal. As a result, there will be a close relationship between the oil/coal price ratio, and the relative growth of demand for each of the two materials.

For such substitution to make a significant dent on the growth of demand for oil, it is not enough that the price ratio is substantially different from the competitive neutrality. Another precondition is that the competing material's initial market share is substantial. If it is not, then even a every fast growth of its market will have little impact on oil, until that market share has attained a substantial size.

If both preconditions hold for a material which is a close substitute to oil, the share of that material's overall energy market will grow. At the same time the share of oil will decline, and the absolute growth of the oil market will be suppressed. If the price ratio remains unchanged, the growth of market share for the substitute will continue until it has replaced oil completely in those market segments where it has a competitive advantage.

However, the price ratio is not likely to remain unchanged during the process. In particular, there are reasons to believe that a slow-down in oil demand growth will weaken petroleum prices.

First, consider the case of competitive petroleum market. It was argued in section 2. that depletion would not impact perceptibly on petroleum prices within the time horizon of the present study, because any cost increase due to a deterioration in the physical resource base was likely to be

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Swedish import statistics of the time suggests that the same price ratio may have held through northwestern Europe.

[10] OECD (1987); *BP Review of World Gas*, several issues.

dwarfed by cost reducing technological progress in exploration, extraction and processing. This, at least, is what historical evidence suggests.

Suppose, however, that the demand growth for oil accelerates to twice or four times the historical rate. A reasonable case can then be argued that the cost reducing technical progress will lag behind the cost increasing deterioration of physical resources, resulting in an upward push of cost and price. An equally reasonable case can be argued in the opposite direction: when substitution arrests the growth of demand for oil, then the likelihood is that technical progress will be faster than resource deterioration, resulting in reduced costs and prices. In this way, the introduction of competitive substitutes for oil on a large scale could well depress oil prices below what they would be in the absence of such substitution.

It must be underlined that the above argument points to a reasonable likelihood, not to a definite certainty. For instance, the effects we discuss might not occur at all if there is a causal relationship between the rate of growth of oil demand, and the rate of cost reducing technological progress in the oil industry. Also, there may be downward cost shifts like that triggered by the discovery of the rich Middle East resource base. Such events will disturb the tendency towards rising costs caused by fast demand expansion.

Second, consider the case of a monopolistic petroleum market. A slowdown in demand growth is even more likely to depress oil prices in this case. The emergence of an aggressive substitute will increase the price elasticity of demand for the colluding producers' output, thereby reducing the scope for profitable monopolistic coordination at each point in time. Fearing a shrinkage of their market, the producers' long run price ambitions are likely to be set below those that would prevail in the absence of the substitute.

The relationship between relative oil prices, and degree of substitution is recursive. With weaker oil prices, the extent of substitution will be less far reaching, and the ultimate share of oil in the total energy market greater than if oil prices remain unchanged.

If the conjectures formulated in section 3. about oil prices averaging about $ 10-12 (1985 $) in the next couple of decades turn true, what then are the prospects for powerful substitutes to oil emerging in the energy markets?

Nuclear energy might have developed into such a substitute, if all the rosy expectations held about this energy source in the 1960s and early 1970s had become true. As events turned out, nuclear power costs have risen, because of safety concerns and ensuing regulation. In addition, public fear and apprehension have come to constitute an absolute restraint on

nuclear expansion. For these reasons, nuclear energy is unlikely to develop into an aggressive substitute for oil in the time span under consideration.

Neither is coal likely to impose itself much further on the markets for oil. Analyses of the end-century coal supply potential (Doyle, 1988) suggest delivered prices in the major industrialized centres of $ 35-42 per ton (1985 $), corresponding to $ 7-9 per barrel of oil equivalent. Such prices will not make coal into a formidable competitor to oil, when oil prices are $ 10-12.

There remains natural gas. Its resource base is less well defined than that for oil and coal (Percebois, 1986), but whatever is known indicates a very large and expandable supply potential at costs and prices that are highly competitive with the price of oil prevailing in the late 1980s (MIT Energy Lab., 1985-86). The technologies of extraction, transport and use of gas are claimed to be inefficient, either because they are old, or because they are oil-based, and not appropriately adapted to gas (Rogner, 1988). The technological development potential, and the scope for reducing costs is therefore considerable.

The competitively neutral price ratio between oil and gas is particularly unstable. The technical change in prospect for gas and a reduction of entry barriers facing producers and consumers of gas, caused by economies of scale and inflexible institutional arrangements in many countries, could substantially increase the competitiveness of this energy material.

Gas might therefore conceivably emerge as a formidably competitive substitute for oil towards the end of the century, provided a number of things turn in its favour. If it did, it could reduce the monopolistic power of petroleum producers. Whether in fact gas will assume this role in the course of the coming decades, remains an open question.

The present section can now be concluded. We have discussed the preconditions, and mechanics under which substitution might reduce the future prices of oil. It is concluded that neither nuclear power nor coal command the required competitive advantage, but that natural gas could possibly play that role, if a number of developments turn in its favour. If so, then oil prices at the end of the present century and beyond could turn out to be lower than the conjecture of $ 10-12 (1985 $) formulated in an earlier section. Developments in the gas market are therefore important to consider when the long run prospects for oil prices are analysed.

5. *Technological and Environmental Shocks and the Price of Oil*

All of the above assumes a reasonably normally functioning world. In

TABLE 3.1

WORLD PRIMARY ENERGY CONSUMPTION BY TYPE OF PRIMARY COMMERCIAL ENERGY, SELECTED YEARS (MILLION TOE)

	1987	1995	2005
OECD			
Oil	1,654	1,797	1,904
nat. gas	730	804	939
solid fuels	936	1,058	1,250
nuclear	312	391	449
hydro + other	255	292	353
TOTAL	3,887	4,342	4,895
CPE			
Oil	676	803	960
nat. gas	615	817	1,345
solid fuels	1,028	1,192	1,530
nuclear	55	119	168
hydro + other	85	106	144
TOTAL	2,459	3,037	4,147

Source: INTERNATIONAL ENERGY AGENCY (1989).

reality, events may, or are even likely to, stray away from the normal path in the extended period under scrutiny.

The number of possible abnormal scenarios with strong and lasting impacts on the price of oil, either upwards or downwards, is infinite. In the following paragraphs we choose to consider the consequences for oil prices of two entirely plausible technological shocks. The first involves an abrupt and complete dismantling of the world's nuclear power, after one or a few very severe accidents with nuclear reactors. The second consists of the reactions to a sudden awareness that the greenhouse effect does have immediate, undesirable and drastic effects on the world's climate. The details of total energy consumption by type of fuel in 1987 and forecast to year 2005, displayed in Table 3 may serve as an instructive base in the treatment of both shocks.

TABLE 3.2

WORLD PRIMARY ENERGY CONSUMPTION BY TYPE OF PRIMARY COMMERCIAL ENERGY, SELECTED YEARS (MILLION TOE)

	1987	1995	2005
DCs			
Oil	684	897	1,138
nat. gas	204	385	701
solid fuels	279	389	666
nuclear	19	22	27
hydro + other	122	166	246
TOTAL	1,308	1,859	2,778
World			
Oil	3,014	3,497	4,002
nat. gas	1,549	2,006	2,985
solid fuels	2,243	2,639	3,446
nuclear	386	532	644
hydro + other	463	564	743
TOTAL	7,654	9,238	11,820

Source: INTERNATIONAL ENERGY AGENCY (1989).

Nuclear power consumption in the OECD countries in the late 1980s corresponds to some 312 Mtoe (6,24 Mb/d) less than the current excess capacity in the OPEC group. The reduction of that energy supply in the nearby future would give the oil cartel a tremendous moral boost, and greatly facilitate its ability to manage supply. There is considerable uncertainty about the way the cartel would utilize its strengthened market position. Its members have certainly learnt from past experience, and it is by no means given that they would act in the same way as they did in response to the political events of 1979-80 which trigged the second oil crisis. In principle, they could replace the entire energy shortfall simply by expanding the utilization of existing capacity, but such an outcome is unlikely. Instead, oil price levels like those prevailing in 1981, or even higher, would probably emerge, as energy consumers substituted nuclear power for oil.

However, the period of high prices would probably not be as extended as the one that began in 1973. The experience of the preceding energy crisis has established a readiness to respond that was not there at all in the mid-1970s. A new crisis would immediately arouse frantic efforts to expand non-OPEC oil capacity. The results would be speedy, since the physical and human capital needed for the purpose was built up early in the 1980s, and can be mobilized with short notice. The crisis would also give rise to intensive activity to expand natural gas and local supply, and to save energy use. In these endeavours too, the world of the late 1980s is far better prepared to act than it was 12 years earlier.

Hence, it is probable that the scrapping of nuclear power in the 1990s, would boost OPEC's market power and cause an oil price explosion, but it is also likely that the tightness in world energy markets would be overcome well before the end of the decade, weakening OPEC's clout, and resulting in falling oil prices.

The impact on the oil market would be greater and more enduring if, instead, nuclear power were to be eliminated through a sudden decision at the end of the century. By that time, nuclear is expected to account for a larger share of total energy consumption in the non-Socialist world.

Also, assuming a surprise-free world energy scenario for the 1990s, there would be little excess capacity in OPEC to draw on, in order to dampen an energy shock in 2000. Finally, a large part of the human and physical capital stock needed to expand energy production, that was built up in the early 1980s, would cease to exist by the end of the century, if oil prices in the 1990s remain relatively low.

The second technological shock to be considered would have an opposite impact on oil. An urgent program to slow down global carbondioxide emissions could be pursued at different levels of ambition and speed. Its impact on the energy sector in general, and on the oil market in particular, would differ correspondingly. Any such program would involve two basic reactions. The first one would be to reduce the use of fossil fuels, and especially those causing the greatest emissions per unit of energy. Coal would be hit the hardest, but a significant decrease of the overall emission levels would certainly require severe cuts in petroleum use too. Natural gas would be the least affected among the fossil fuels.

Hydro and nuclear power would receive a strong boost, as efforts would focus on compensating for part of the fossil shortfall. But since fossil fuels account for very dominant shares of total energy consumption, it would not be feasible to replace any large cut in their use by expansion of other energy sources within the time span of a decade or two. Hence, the

second basic reaction would be to mount large-scale energy saving programs.

Both reactions would have a negative impact on oil demand and oil prices. In the extreme, the use of oil as an energy material might collapse, leaving the demand for feedstocks in the chemical industry as the major oil market, with prices declining towards the production cost of the rich and abundant resources in the Middle East. The value of all other resources of oil in the ground would then fall to zero.

6. *A Summary of Conclusions*

Except for its size in terms of value, the international market for oil does not appear to be exceptional in any important respect, in comparison with the markets for other commodities. The historical development of oil prices between 1900 and 1972 is not strikingly different from that for metals, or for agricultural commodities.

Our analyses reveal that oil price formation during the present century has not been perceptibly influenced by exhaustion. Neither is it likely to be affected by this factor over the two to three decades into the future, which constitute the time horizon of the present study. The unimportance of exhaustion for price developments is not exclusive to oil. It is equally applicable to virtually all primary commodities.

The low price elasticity for oil demand combined with a concentration of its production, provides scope for monopolistic manipulation. The extreme geographic concentration of the most economic resource base for this material makes it possible for producers to exert monopolistic power even in the long run, provided that they are not over-ambitious. These features make oil unusual, but in no way unique among commodities. Metals like cobalt, niobium, platinum and tin possess somewhat similar characteristics.

Like the price of any commodity, the price of oil will tend to be reduced by the emergence of competitive substitutes. The study suggests that fortuitous technological and commercial breakthroughs in natural gas might greatly speed up the substitution of oil for gas. The ensuing slowdown in the expansion of oil demand would dilute the monopolistic power of oil producers, and dampen oil price developments.

Future technological shocks could impact strongly on petroleum prices over long periods of time. The study considers briefly the oil price explosion that would ensue if there were a sudden nuclear moratorium, and the possible collapse of oil prices if the adverse consequences of the greenhouse effect lead to global restrictions on fossil fuel use. Oil stands out among

primary commodities by its extraordinary weight and importance to the world economy. The economic repercussions of technological shocks affecting oil, such as those discussed in this study, would therefore be much more severe than the consequences of similar shocks affecting any other primary material.

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I FATTORI DI LUNGO PERIODO CHE INTERVENGONO NELLA DETERMINAZIONE DEI PREZZI DEL PETROLIO

L'articolo illustra ed analizza l'impatto dei fattori di lungo periodo che maggiormente incidono nella determinazione dei prezzi petroliferi. Si è inteso verificare se il trend dei prezzi di una risorsa esauribile come il petrolio sia stato significativamente diverso (nel periodo 1900-1972) da quello registrato da altre risorse non esauribili.

Pur con le debite cautele, sembra si possa affermare che il comportamento dei prezzi petroliferi non sia stato difforme da quello delle altre materie prime. Fattori come l'esauribilità ci pare non abbiano svolto un ruolo preminente né per il petrolio né per le risorse oggetto dell'analisi. Basse elasticità per la domanda del petrolio, e relativa forte concentrazione delle aree di produzione favoriscono

tendenze monopolistiche. Infine, possibili futuri "shock tecnologici", come una moratoria nucleare o forti limitazioni nelle emissioni di CO_2, dovrebbero accentuare la sostituzione con altre fonti energetiche e, comunque, indurre ad un contenimento dei consumi petroliferi.

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EVOLUTION OF GNMA PRICES: EMPIRICAL EVIDENCE

by
BARBARA RINDI *

Introduction

The issue concerning the effects of the introduction of futures trading on cash market prices seems to be unsolved, both from a theoretical and from an empirical point of view. The effects of futures trading on the variability of the "general level" of cash prices have different origins [1]; some of them are related to the "price discovery" and "risk-sharing" roles of futures trading, which basically increase the liquidity of the cash-markets; other effects are due to the price distortions which can generate from futures markets and are transmitted to cash prices through arbitrage [2].

Three are the prevailing sources of futures price distortions induced by a non-competitive behaviour of the agents trading in the financial markets: the excessive degree of market power of floor traders; the principal/agent issue with the related problems of fraud and dual trading; and the monopolistic behaviour of futures traders, which determines artificially inflated prices through phenomena such as corners and squeezes. The theoretical debate on the stabilizing or destabilizing role of financial futures hinges on the effects of the increased speculative activity which futures trading brings about.

From an empirical point of view, most of the existing studies have analysed the effects of the introduction of financial futures on the variability

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[1] Futures trading also influences cash prices around the expiration-day of futures contracts; this paper is not concerned with this specific problem because the empirical evidence on the "expiration-day effects" is generally acknowledged (see STOLL, 1988, and EDWARDS, 1988).

[2] For a more comprehensive discussion on the causes of the effects of the introduction of futures trading on cash market prices see RINDI (1988).

of daily, weekly, monthly and annual cash prices. In order to control the effects of exogenous factors on the volatility of cash prices, the most commonly used technique has been that of using regression analysis and of introducing in the regression the volatility rate of a money market instrument without an associated futures market. This methodology implicitly assumes that markets for different securities are separated, and such an assumption is unrealistic. Froewiss (1978) shows not only that trading does not destabilize spot prices, but also that, on the contrary, it rather increases the efficiency of the cash market; he does so by using 10-years U.S. Treasury-bonds as a control variable for monitoring the volatility of Government National Mortgage Association (GNMA) [3] prices.

The same control and dependent variables are used by Figlewski (1981), whose empirical work is the only one showing some evidence that the introduction of futures markets increases the variability of cash market prices.

Simpson and Ireland (1982), while investigating the spot price variability of GNMA certificates before and after trading in financial futures was introduced, include 10-years Federal National Mortgage Association (FNMA) securities as a control variable. The test of structural change they run on their regression model suggests that the spread between the GNMA and FNMA volatility does not change as a result of the introduction of futures contracts on GNMA certificates.

Another fallacious assumption, which is often used in the empirical works on this topic, concerns the hypothesis of stationarity (at least on suitably transformed series) on which ARIMA models are based.

Bhattacharya, Ramjee and Ramjee (1986) run a statistical test using ARIMA methods and draw conclusions on the causality relation between the volatility of cash and futures GNMA prices. The issue in question is whether the advocated weak causal relation between the volatility of the near futures contracts prices (suitably transformed) and the volatility of the underlying GNMA (8% coupon) prices stands on solid ground when it is

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[3] The creation of the GNMA certificates represents a solution to the attempt by the real estate community and in particular by the Government National Mortgage Association to support the housing market by making mortgages more attractive to all types of investors. An investor holding a GNMA modified pass-through certificate owns a share in a pool of insured mortgages where the payment of the interest and principal is guaranteed by the GNMA. Hence the characteristics of the GNMA securities have, among others, two basic advantages: they enable investors to hedge mortgage-interest risks and they solve the problem of the lack of homogeneity among mortgages which previously made these securities less attractive.

Futures trading in GNMA securities was introduced in 1975 by the Chicago Board of Trade.

based on the hypothesis of stationarity of both the (transformed) series involved.

The lack of theoretical justifications for some precise behaviour of the price series (after the introduction of futures trading) and the above mentioned drawbacks of the existing empirical literature, suggest the use of a statistical analysis method with only a minimum of "a priori" requirements. By using one of such methods, namely spectral analysis, we shall be able to test the soundness of the basic hypothesis underlying most previous empirical works: the stationarity of the data series. As a consequence it will be possible either to confirm previous results or, in the case of non stationarity, to assert that the use of such methodologies does not enable us to draw conclusions on the effects of the introduction of futures trading on cash prices.

In Section 1 the research methodology is outlined: the data set and the statistical tools used are described. In Section 2 the empirical results regarding the characteristics of the data set are discussed.

Section 1: Research Methodology

1.1. The data. – The following analysis is based upon daily cash prices data of GNMA certificates. There are two reasons for this choice: first of all, GNMA certificate prices were also used in most of the previous empirical works and the analysis of the behaviour of the same securities allows for interesting comparisons when using different statistical techniques; secondly, dealing with GNMA securities it is possible to leave aside those cash price distortions which might result from the monopolistic behaviour of investors. It seems that the actual regulatory framework and contract specification regarding the GNMA market properly tackles the problem of fraudulent manipulation and market congestion resulting from supply bottlenecks.

Had the Treasury-bills prices been chosen for this analysis, the possibility of market squeezes would have had to be taken into consideration. This is due to the fact that the Treasury-bills futures contract offers some potential for market congestion, as the number of bills (of different maturities) deliverable on the futures contracts is rather limited.

Simpson and Ireland (1985) use Treasury-bills data in order to study the impact of financial futures on the underlying cash market prices; they investigate market congestion by analysing the discount relationship between Treasury-bills deliverable on futures contracts and Treasury-bills with

adjacent maturities, but not deliverable on futures contracts. This analysis indicates that market congestion exists, since the discounts on deliverable Treasury-bills appear to be distorted before the delivery date, although by only a few basis points.

In this paper we will analyse both the behaviour of the time series of prices and of some of its transformations. For the analysis of the overall stability of the series, data on the prices of GNMA 8% and 9% coupon issues from June the 26th, 1979 to May the 18th, 1989 are used [4]. The 8% coupon is nominally the deliverable security for the future contract, but there is a number of different coupon GNMAs which, according to a set formula, may be delivered in place of the 8% coupon.

This analysis considers in particular GNMA 9% coupons, because the structure of GNMA prices has often been such that it has been advantageous to deliver 9% instead of 8% GNMA coupon. This tendency has linked the futures market to a higher coupon issue [5]. Data on the prices of GNMA 8% coupons from August the 13th, 1974 to the end of June 1978 are used for detecting any eventual instability of the series resulting from the introduction of futures trading [6].

1.2. Data characteristics. – The analysis of the effects of the introduction of futures trading on the prices of the underlying securities looks for potential changes in the level or in the variability (variously defined) of the series in question. A rigorous approach to this problem requires certain characteristics of the price series. These characteristics are mainly linked to some forms of stability of the time series. The hypothesis which is usually made is that of stationarity of the raw data, or of a suitable transformation of these data, at least during the periods in which the possible source of change comes into action. If this hypothesis does not hold, it is not only risky to use some statistical methodologies such as ARIMA models, but it is also difficult to say anything about the changes of the series induced by an exogenous influence.

Intuitively, it appears difficult to ascribe some changes in the shape of the series to any specific cause, since the shape of the series is changing continuously. Even if it were possible to do so – and to some extent it is – the relevance of the results would be negligible: any change, relevant to our

[4] Data of GNMA bid prices for this period were kindly supplied by the Citicorp Scrimgeour Vickers, Corporate Finance Division.

[5] See FIGLEWSKI (1981).

[6] Data on GNMA bid prices for this period were obtained from the *Wall Street Journal*, which has been publishing data on GNMA 8% coupon since August the 13th, 1974.

analysis, would be overwhelmed by the continuously changing behaviour of the series.

The hypothesis of stationarity, or at least stability, is referred sometimes to the series itself (ARIMA models) [7], sometimes to the residuals of the regression of the price series on control variables and explicative dummy variables [8]; it can be considered to be the necessary assumption in order to establish the characteristic stance and relevance of the (possible) changes within the series due to an external shock. Consequently, it is important to evaluate the plausibility of this hypothesis for two reasons: in order to discover the effective changes in the level or in the volatility of the series caused by the introduction of futures markets, but also in order to assess the relevance of these changes if they exist. The latter reason being probably the most important.

In this work only the series of GNMA prices are used (and not the data from regression analysis); therefore the results will be relevant only if compared with the results of works based on ARIMA models. Obviously the same methodology can be applied to the residuals of the regressions proposed by various authors.

Section 2: Evolutionary Spectra and Test of Stationarity

The test of stationarity used in this analysis has been proposed by Priestly and Subba Rao (1969). It derives from the concept of evolutionary spectra and has the great advantage of requiring very few hypotheses on the series examined. Two disadvantages in the use of this test might be its need for a lot of data and the asymptotic nature of the distributional results on which it is based [9]. Since the concept of evolutionary spectra is not yet commonly used, this section will provide a brief introduction to the main ideas of the evolutionary spectra theory and to the basic structure of the Priestley/Subba Rao test [10].

2.1. Spectral analysis and evolutionary spectra. – Following Priestley (1988), the spectrum (or more precisely, the spectral density function) of a

[7] See FROEWISS (1978), SIMPSON and IRELAND (1982), MORIARTY and TOSINI (1985), BHATTACHARYA, RAMJEE and RAMJEE (1986).

[8] See FROEWISS (1978), FIGLEWSKI (1981) and MORIARTY and TOSINI (1985).

[9] The first disadvantage is no longer a problem in this paper, since the series of GNMA prices available for this work is considerably long; the second disadvantage is a problem shared with the common ARIMA based analyses.

[10] For a more detailed discussion see PRIESTLEY (1966).

stationary series $\{X_t\}$ with autocovariance function $R(r)$ is defined as

$$h(w) = 1/2\,\pi \left[\sum_{r=-\infty}^{\infty} R(r)\, e^{(-iwr)} \right] \qquad -\pi \leq w \leq \pi \qquad [1]$$

$$\text{if} \sum_{r=-\infty}^{\infty} |R(r)| < \infty \qquad [2]$$

$h(w)$ has the basic property of being interpretable as a power/frequency distribution.

It can be shown that even if $R(r)$ does not decrease fast enough for the function $h(w)$ to exist, it is possible to give a spectral representation of X_t. Hence any discrete parameter stationary series can be represented as a "sum" of sines and cosines involving a continuous range of frequencies over $(-\pi, \pi)$ with random amplitudes and random phases.

When the hypothesis of stationarity is relaxed, in order to preserve the above mentioned physical interpretation, the "spectrum" must become time dependent. It is possible to define such a time dependent spectrum by considering a class of non-stationary processes whose statistical characteristics are changing smoothly over time. In this case what is needed is a generalized notion of frequency on which the theory of evolutionary spectra can be based. In other words, in order to introduce the notion of frequency into the analysis of non-stationary processes, one must substitute sines and cosines with new "basic elements" (or family of function $\{\phi_t(w)\}$ which represents a spectral decomposition of X_t) which, although non-stationary, have an oscillatory form and in which the notion of frequency is still dominant.

If there exists a properly defined family of oscillatory functions

$$\phi_t(w) = A_t(w)\, e^{(iwt)} = \left(\int_{-\infty}^{\infty} e^{(it\Theta)}\, dK_w(w) \right) e^{(iwt)} \qquad [3]$$

such that $\{X_t\}$ can be represented as

$$X_t = \int_{-\infty}^{\infty} \phi_t(w)\, dZ(w) \qquad [4]$$

where

$$E[\,|dZ(w)|^2] = d\mu(w) \qquad [5]$$

then $\{X_t\}$ will be called an oscillatory process. It can be shown that [4] can be interpreted as the limiting form of a "sum" of sine waves with different frequencies and time-varying random amplitudes $\{A_t(w)\, dZ(w)\}$.

We can then define the evolutionary power spectrum:

"Let $\mathfrak{F}$ denote a particular family of oscillatory functions, $\{\phi_t(w)\} = \{A_t(w)\, e^{(iwt)}\}$ and let $\{X(t)\}$ be an oscillatory process having a representation of the form [4] in terms of the family $\mathfrak{F}$. We define the evolutionary power spectrum at time t with respect to the family $\mathfrak{F}$, $dH_t(w)$, by

$$dH_t^*(w) = |A_t(w)|^2\, d\mu(w) \qquad [6]$$

The evolutionary spectrum has some interpretation as the spectrum of a stationary process, namely that it describes a distribution of power over frequency, but whereas the latter is determined by the behaviour of the process over all time, the former represents specifically the spectral content of the process in the neighbourhood of the time instant t" [11].

It is interesting to notice that as far as $\text{var}\{X(t)\}$ can be shown to be

$$\text{var}\{X(t)\} \equiv R(t, t) = \int_{-\infty}^{\infty} |A_t(w)|^2\, d\mu(w) \qquad [7]$$

and that, considering equation [6], it can be written in the form

$$\text{var}\{X(t)\} = \int_{-\infty}^{\infty} dH_t(w), \qquad [8]$$

it follows that although $dH_t(w)$ depends on the choice of family $\mathfrak{F}$, its integral which represents the total power of the process at time t (where the contribution from "frequency" w is $\{|A_t(w)|^2\, d\mu(w)\}$), is independent of the particular chosen family $\mathfrak{F}$. Nevertheless, the theoretical derivation of the evolutionary spectra still remains crucial for the interpretation of the obtained results. When $\mu(w)$ is absolutely continuous, it is possible to write

$$dH_t(w) = h_t(w)\, dw \qquad [9]$$

where $h_t(w)$ is the evolutionary spectral density function.

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[11] See PRIESTLEY (1988, pag. 148). This is only one of the possible definitions of spectra for non-stationary processes, see LOYNES (1969). The aim of this and other definitions is to justify the rather old and common practice of computing "mobile" spectra giving them an analogous interpretation to the one used in the stationary case.

It is worth saying that the test used in this paper is mostly independent of the specific interpretation given to the notion of spectra for non stationary processes as it is based only on the distributional results under H_0: stationarity. Yet, the notion of evolutionary spectra is useful for the interpretation of the results of this analysis when H_0 is rejected.

According to Priestley (1966), the estimation of $h_t(w)$ is performed in two stages: firstly, data are passed through a linear filter $\{g(u)\}$ centered on the frequency w_o and whose "width", B_g, is much smaller than the width of the series, B_x. This procedure yields an output U_t equal to

$$U_t = \sum_u g_u X_{t-u} e^{(-iw_o(t-u))} \qquad [10]$$

Secondly, a weighted average of $|U_t|^2$ around the time point t is computed in order to provide an estimate of the local power density at frequency w_o. We then have:

$$\hat{h}_t(w_o) = \sum_v w_v |U_{t-v}|^2 \qquad [11]$$

where the function w_v is such that its "width is much larger than B_g.

2.2. Test for stationarity. – According to the Priestley/Subba Rao test, the evolutionary spectrum of the series is estimated over a range of time points. If the series was stationary, the spectra would have the same shape in the different points of time. The test is basically an application of the two factor analysis of the variance model to the spectra; its objective is to assess whether there is a time effect on the relative weight of the frequencies [12]. This test has also the advantage of providing the analysis of the character of the non-stationarity of the series when such non-stationarity exists. The way this test is implemented is straightforward and consists in the computation of the logarithm of the estimated spectral density function, i.e.

$$Y(t_i, w_j) \equiv \log_e\{\hat{h}_{ti}(w_j)\} \qquad [12]$$

at certain (suitably chosen) instants and at different frequencies. On the basis of the resulting table, which intuitively indicates the relative "importance" of the different frequency components at different instants, the standard analysis of variance table is constructed. It takes into consideration two factors: time and frequency (Table 1).

This method is useful for the analysis of the relative significance of both "between times" and "between frequencies" sums of squares and allows us to draw inferences on the stationarity of the series; by following this method it is also possible to analyse the interaction of frequencies at

[12] This is a test for second order stationarity of the series; the presence of a trend is accounted for by considering a long period cycle. As we will underline later, this fact might induce the phenomenon of "leakage" in the estimation of the spectrum. Consequently the results of the test must be evaluated with care when the low frequencies have too much power.

TABLE 1

Item	Degrees of freedom	Sum of squares
Between times	$I - 1$	$S_T = J \sum_{i=1}^{I} (Y_{i.} - Y_{..})^2$
Between frequencies	$J - 1$	$S_F = I \sum_{j=1}^{J} (Y_{j} - Y_{..})^2$
Interaction + residual	$(I - 1)(J - 1)$	$S_{I+R} = \sum_{i=1}^{I} \sum_{j=1}^{J} (Y_{ij} - Y_{i.} - Y_{j} + Y_{..})^2$
Total	$IJ - 1$	$S_o = \sum_{i=1}^{I} \sum_{j=1}^{J} (Y_{ij} - Y_{..})^2$

Source: PRIESTLEY (1988, pag. 179).

different points in time and to verify whether the spectra are uniform or not.

Section 3: Empirical Results

The empirical estimate of the spectral density function was performed by making the following hypotheses on the functions $g(u)$ and $w_T(v)$:

$$g(u) = \begin{cases} 1/\{2((7\pi)^{1/2})\}, & |u| \leq 7 \\ 0, & |u| > 7 \end{cases} \qquad [13]$$

$$w_T(v) = \begin{cases} 1/2T, & -T \leq v \leq T \\ 0, & \text{otherwise} \end{cases} \qquad [14]$$

This gives a variance of $Y(t_i, w_j)$ equal to

$$\sigma^2 = 14/3T$$

The frequencies $\{w_j\}$ were chosen as follows:

$$w_j/\pi = j/20 \qquad j = 1\,(3)\,19$$

to a uniform spacing of 3/20.

The analysis has been conducted on four data series: the raw data, as previously described; their first differences; the volatility being defined as

$$V_T = \sqrt{\left(\sum_{j=5T-3}^{5T} ((X_j - X_{j+1})^2)/5 \right)}$$

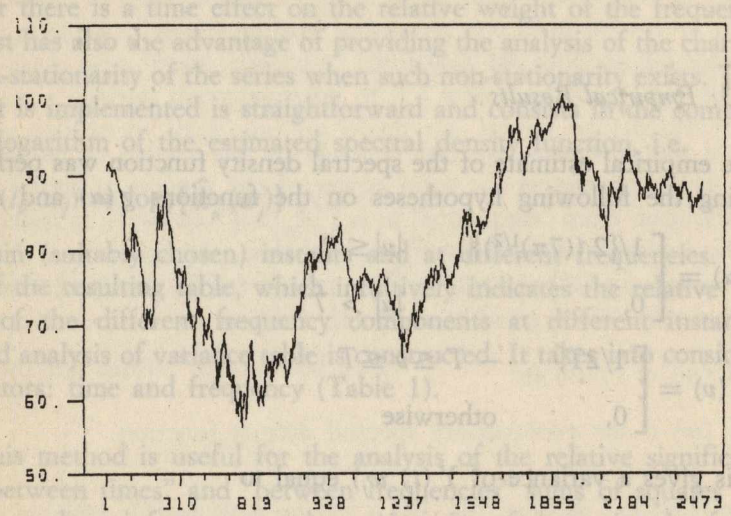
with $T = 1, \ldots, 495$;

and the first differences of $\log V_T$ as

$$\Delta LV_T = (1 - L) \log V_T \qquad T = 1, \ldots, 494.$$

A simple glance at the plot of the first series, – raw one – (Figure 1), can already bring strong doubts on the hypothesis of stationarity. Nevertheless, the analysis of this series provides a benchmark for making comparisons with the results of the subsequent estimate [13].

FIGURE 1: GNMA 8% coupon price (from July the 2nd, 1979 [= 1] to May the 18th, 1989 [= 2473]).



[13] The validity of the Priestley/Subba Rao test was examined by simulating the following AR (2) model:

$$Y_t = 0.8\, Y_{t-1} - 0.4\, Y_{t-2} + \varepsilon_t \qquad \text{with } E(\varepsilon_t) = 0 \text{ and}$$

$$\text{Var } (\varepsilon_t) = 100^2$$

3.1. The characteristics of the GNMA prices series. – The procedure used for the analysis of the series of the raw data will be described in some detail, whereas the results relating to the other series will be simply outlined with a few comments.

In the estimation procedure the filters $g(u)$ and $w(T)$ have the shapes described earlier (equations [13] and [14]) with semi-amplitude T equal to 100. This allows estimating the spectrum at 12 points in time from $t = 108$ to $t = 2308$. The frequencies at which the spectra are estimated run from 1/20 to 19/20 by 3/20 (angular frequencies normalized to π).

The theoretical variance of the log-spectra under H_o: stationarity, is thus $4h/6T = 7/150 = 0.046$. The table of the logspectra (Table 4) is given hereunder with the times on the rows and the frequencies on the columns.

The evolutionary spectra were estimated for $t = 58\,(100)\,358$.

Tables 2 and 3 show the results of the test. In particular, according to the ANOVA table (Table 3), the hypothesis of overall uniformity of power across time (first row) and of power among frequencies cannot be rejected. These results are consistent with the characteristics of a stationary series such as the AR (2). Results regarding the modulated Y_t series can be found in PRIESTLEY (1988).

TABLE 2

t	w/π						
	1/20	4/20	7/20	10/20	13/20	16/20	19/20
58	6.47	6.58	6.42	5.38	5.06	4.55	3.71
158	6.21	6.49	6.23	5.23	4.47	3.89	3.42
258	6.43	6.67	6.64	4.99	4.48	4.05	3.78
358	6.22	6.68	6.54	5.00	4.54	4.22	3.49

TABLE 3

ANALYSIS OF VARIANCE

Source of variation	Sum of squares	DF	$\mathfrak{X}^2 = (\text{sum of squares}/\sigma^2)$
Time	0.37	3	3.92
Frequencies	34.85	6	373.34
Interaction + Residual	0.48	18	5.13
Total	35.69	27	–

TABLE 4

t	w/π						
	1/20	4/20	7/20	10/20	13/20	16/20	19/20
108	9.26	6.68	5.47	4.33	2.73	− 2.85	2.41
308	9.16	6.58	5.37	4.23	2.63	− 2.82	2.31
508	8.79	6.20	5.00	3.86	2.26	− 2.74	1.94
708	8.81	6.23	5.02	3.88	2.28	− 3.26	1.97
908	9.21	6.62	5.41	4.27	2.67	− 3.80	2.36
1108	9.10	6.52	5.31	4.17	2.57	− 4.25	2.25
1308	9.04	6.45	5.24	4.11	2.51	− 3.67	2.19
1508	9.27	6.68	5.47	4.34	2.74	− 3.74	2.42
1708	9.54	6.95	5.74	4.61	3.01	− 3.64	2.69
1908	9.59	7.00	5.79	4.66	3.06	− 3.56	2.74
2108	9.43	6.85	5.64	4.50	2.90	− 3.42	2.58
2308	9.42	6.84	5.63	4.49	2.89	− 4.33	2.58

The ANOVA table (Table 5) is the following:

TABLE 5

ANALYSIS OF VARIANCE

Source of variation	Sum of squares	DF	$\mathfrak{X}^2$ = (sum of squares/σ^2)
Time	3.2310	11	69.237
Frequencies	1163.3000	6	24927.000
Interaction + Residual	4.0600	66	87.000
Total	1170.6000	83	–

The third row is the first one to be considered; the H_o hypothesis is that of an homogeneous behaviour of frequencies over time. The value 87 must be compared with the $\alpha\%$ upper quantile of the $\mathfrak{X}^2$ distribution with 66 degrees of freedom. At any reasonable confidence level the value 87

appears to be small and the hypothesis of homogeneous variation of power among frequencies across time cannot be rejected. The second hypothesis to test is the variation of the overall power across time. This is shown in the first row of Table 5. By comparing the value of 69.237 with the upper $\alpha\%$ quantile of the $\mathcal{X}^2$ distribution with 11 degrees of freedom it is possible to argue that at any reasonable level of confidence the value of 69.237 must be considered high. This leads to the rejection of the hypothesis H_o: no overall variation of power across time.

The second row tests the hypothesis of homogeneous distribution of power among frequencies (a "whiteness" hypothesis); this hypothesis is not of immediate interest in this work. The value of 24927 clearly contradicts this hypothesis.

From these results it can be concluded that, trusting the asymptotic theory of the distribution of the logspectra, the series under examination are characterised by some shifts of the overall power across frequencies. This is compatible with a model of the series which is uniformly modulated [14], namely a process which can be reproduced, for example, by passing a stationary process through a time-varying filter with constant "gain" across frequencies. An easy physical model of this can be offered by a simple musical note which is played at different volume levels. Without pushing the analysis too far, having so little evidence, these results lead to consider the market as a stable structure with different levels of overall activity across time (it gives out always the same note, but sometimes whispered, sometimes shouted).

The direct examination of the spectra is a useful further analysis, but beyond the scope of this paper. In this particular case the predominance of the long waves and the little power of the high frequencies (except the highest one) gives evidence of the existence of a trend in the series. It is worth noting that the trending of the series can result in a large "leakage" among frequencies even with this kind of estimation.

The first differentiated series was analyzed with exactly the same values of the filters $g(u)$ and $w(T)$ and exactly the same sampling of time and frequency points. The logspectra table (Table 6) is the following:

[14] See PRIESTLEY (1988, pag. 179).

TABLE 6

t	w/π						
	1/20	4/20	7/20	10/20	13/20	16/20	19/20
108	− 2.05	− 2.56	− 2.70	− 2.68	− 2.83	− 3.02	− 2.80
308	− 2.14	− 2.72	− 2.41	− 2.71	− 2.49	− 2.38	− 2.58
508	− 2.08	− 2.51	− 2.48	− 2.77	− 2.62	− 2.13	− 2.22
708	− 2.69	− 2.59	− 2.68	− 3.42	− 2.81	− 2.75	− 2.71
908	− 2.93	− 3.02	− 3.24	− 3.73	− 3.68	− 3.49	− 3.80
1108	− 3.53	− 3.36	− 3.78	− 3.70	− 3.56	− 3.76	− 3.63
1308	− 3.17	− 2.92	− 3.20	− 3.09	− 3.39	− 2.99	− 3.60
1508	− 3.19	− 3.15	− 3.19	− 3.38	− 3.37	− 3.20	− 3.85
1708	− 2.88	− 3.11	− 3.02	− 3.24	− 3.27	− 3.35	− 3.39
1908	− 3.16	− 2.82	− 2.96	− 3.21	− 3.11	− 2.94	− 3.35
2108	− 2.78	− 2.64	− 3.28	− 3.21	− 3.04	− 2.96	− 3.08
2308	− 3.95	− 3.86	− 3.76	− 3.64	− 3.73	− 3.57	− 3.56

and the ANOVA table (Table 7) is:

TABLE 7

ANALYSIS OF VARIANCE

Source of variation	Sum of squares	DF	$\mathcal{X}^2$ = (sum of squares/σ^2)
Time	13.7110	11	293.810
Frequencies	1.3299	6	28.497
Interaction + Residual	2.8137	66	60.294
Total	17.8550	83	–

As in the previous case the hypotheses of overall uniformity of power across time (first row) and of uniformity of power among frequencies are rejected while the hypothesis of no-interaction across time and frequencies cannot be rejected.

This result is consistent with the previous one and is still in the direction of the uniformly modulated model of the series. It is worth noting

that, after having differentiated the series, a lot of power in the low frequencies has been removed and, even though the process cannot be considered a modulated white noise (see the second row in the ANOVA Table), the results are in the direction of a rather homogeneous distribution of power across frequencies.

The authors who analysed the effects of the introduction of futures trading on cash market prices have used different definitions of volatility. The definition used here is similar to that of Figlewski (1981), Moriarty and Tosini (1985) and Bhattacharya, Ramjee and Ramjee (1986), with the difference that here it is computed on five days without considering whether those five days belong to the same week [15].

The logspectra table (Table 8) is the following:

TABLE 8

	w/π						
t	1/20	4/20	7/20	10/20	13/20	16/20	19/20
58	–.70	– 2.97	– 3.76	– 4.06	– 4.24	– 4.18	– 4.62
158	–.93	– 3.34	– 4.26	– 4.63	– 4.91	– 4.99	– 5.32
258	– 1.43	– 3.82	– 4.87	– 5.16	– 5.50	– 5.19	– 5.29
358	– 1.39	– 3.62	– 4.28	– 5.49	– 5.23	– 5.06	– 5.11

and the ANOVA table (Table 9) is:

TABLE 9

ANALYSIS OF VARIANCE

Source of variation	Sum of squares	DF	$\mathfrak{X}^2$ = (sum of squares/σ^2)
Time	3,75630	3	40,246
Frequencies	48,98200	6	524,810
Interaction + Residual	0,67391	18	7,220
Total	53,41300	27	–

[15] FIGLEWSKI (1981) and MORIARTY and TOSINI (1985) used 1-month-period data.

Given the reduced sampling period, the half width of the $W(T)$ filter is set equal to 50.

Once again the results are in the uniformly modulated direction, but in this case, as opposed to the previous one, the distribution of power across frequencies is not constant at all: it privileges the low frequencies.

The last analysis considers the differentiated log of V_T and is directly comparable with the results of Bhattacharya et al. [16]. The logspectra table and the ANOVA table are the following (Tables 10 and 11):

TABLE 10

	w/π						
t	1/20	4/20	7/20	10/20	13/20	16/20	19/20
58	− 4.60	− 4.02	− 2.86	− 2.14	− 1.66	− 1.58	− 1.90
158	− 4.84	− 3.98	− 3.26	− 2.56	− 2.11	− 2.08	− 2.26
258	− 5.14	− 4.20	− 3.64	− 2.37	− 2.53	− 1.76	− 1.80
358	− 4.46	− 3.33	− 2.81	− 2.89	− 1.93	− 1.92	− 1.83

TABLE 11

ANALYSIS OF VARIANCE

Source of variation	Sum of squares	DF	$\mathfrak{X}^2$ = (sum of squares/σ^2)
Time	0.77024	3	8.2525
Frequencies	29640.00000	6	317.5700
Interaction + Residual	1.35690	18	14.53800
Total	31.76700	27	–

There are no important changes from the previous results.

The value of 8,2525 for testing the hypothesis H_o, homogeneous overall distribution of power across time, could lead to the acceptance of this hypothesis if the α was of 0,025. This could justify, not without risk, the use of an ARIMA model for the series.

[16] See BHATTACHARYA, RAMJEE and RAMJEE (1986, pag. 37).

These results have been obtained using the GNMA 8% coupon price series. The same test has been run on the series of the GNMA 9% coupon. The latter price series substantially shows the same price characteristics as the previous one.

3.2. The effects of the introduction of futures trading. – The above described technique has been applied to data of GNMA prices relative to the periods before and after the introduction of futures trading. The objective is essentially that of making comparisons with previous empirical works. Nevertheless, the results of the Priestley/Subba Rao test described so far call for caution. The reason for this is that the technique used here, as those used in other empirical literature, is based on the choice of a "changing point" and on the hypothesis that during a certain period before and after this "changing point" the series is rather stationary. The advantage of spectral analysis is that it does not rely on an aprioristic specific structure of the model of the price series; the different characteristics of the spectra before and after the introduction of futures trading allow a deeper analysis of the many possible changes of behaviour of the series in the two periods. Yet even if the results were in the direction of higher instability after the introduction of futures markets, it would still be impossible to perceive whether this instability was due to this particular event or not. The overall instability of the series will not even allow for the evaluation of the relevance of this phenomenon.

Two groups of daily GNMA data have been used for this analysis. They consist of 303 observations on cash prices before and after the introduction of futures trading; the gap of 100 observations between the two groups enables the eventual phenomenon to stabilize. The analyses relative to the raw data and to their first differences are reported hereunder [17].

The ANOVA tables are the following:

TABLE 12

ANALYSIS OF VARIANCE

Source of variation	Sum of squares	DF	χ^2 = (sum of squares/σ^2)
Time	0.00027	1	0.0086
Frequencies	202.17000	6	6443.5000
Interaction + Residual	0.21370	6	6.7778
Total	203.39000	13	–

[17] The analysis of the variability of the series has not been performed because of the small number of observations on the period before the introduction of futures trading.

TABLE 13

ANALYSIS OF VARIANCE

Source of variation	Sum of squares	DF	$\mathfrak{X}^2$ = (sum of squares/σ^2)
Time	1.27880	1	43.7270
Frequencies	3.30340	6	104.7600
Interaction + Residual	0.05582	6	1.7704
Total	4.73800	13	–

Tables 12 and 13 show that the H_o hypothesis of homogeneity of the spectrum over time is not rejected for the raw series whereas it is rejected for the first differentiated data. Once again the process can be considered as a uniformly modulated one. The apparent divergence between the results relative to the two series we have examined can be explained by considering that the raw series is characterized by a trend in both the period before and after the introduction of futures trading. From the "spectral analysis point of view" this can be interpreted as a dominance of the low frequency over the high frequency components, which prevents the technique from pointing out their effective difference. By differentiating the series, one gets partially rid of the trend and allows for a clearer analysis of the relations among the high frequency components of the series in the two periods.

Conclusions

The aim of this paper was to examine some features of the GNMA cash market prices in order to qualify previous results on the possible effects of the introduction of futures markets, which took place in 1975, on both the level and the volatility of these prices.

The conclusion we reach is that, if a change in the behaviour of the series has taken place (and the literature is not unanimous in this respect), this effect must be read in the context of the overall behaviour of the series. In particular this effect must not be considered important if it is not comparable in strength with the continuously evolutionary process which governs the series. Furthermore, a criticism can be moved to some analyses in the literature which base the assessment of the influence of a changed regime on an alleged stationarity of the series before and after the change occurred.

Within the limits of the hypotheses which in this paper are less restrictive than the usual ones, the obtained results consistently underline the non-stationary structure of the process of GNMA prices.

The series appears to follow a uniformly modulated process. In simple terms this means that the variance of the series is not constant over time, although its "percentage" distribution across frequencies does not vary over time. From these results it follows that the market model, which is consistent with this kind of observed price process, can be constructed, so to speak, by passing a white-noise through a filter which has a stable response structure and is subject to a variable flow of impulses which depends on time but not on frequencies. This has the advantage of diverging only a little from the hypothesis of stationarity of the series. The following step would be that of separating the two components, the stable response and the variable impulses (i.e. to "demodulate" the process), by using suitable techniques which obviously cannot rely upon the hypothesis of stationarity.

Therefore, we can reformulate the issue at stake in this paper: the question whether the price series has become a different entity after the introduction of futures markets is not a useful question; the point is whether the continuous evolution of the process has been markedly influenced by the introduction of futures trading.

This paper intended to assert the general instability of the GNMA price series and not the causes of this instability: for example, one possible explanation of some of the post 1979 instability might be ascribed to the change of the Federal Reserve Board's monetary policy which in 1979 shifted from interest rates to monetary aggregates targets. In spite of this, whatever the off-setting cause, the real problem remains that, if a series is continuously subject to different shocks, it is difficult to sort out the causes of each particular change, especially when using methods which are based on the hypothesis that only one change, if any, may occur.

In this sense, the results relative to the effects of the introduction of futures trading must be evaluated with great caution and, even if they are in the direction of a change of regime, particularly when the high frequencies are concerned, such a change cannot be considered to be relevant without a further analysis, and induced by the new regime. The understanding of the phenomenon might be improved by introducing in the analysis a control variable which could absorb all the external influences on the GNMA prices with the exception of the effects of the introduction of futures trading. This is a possible further application of the technique used here.

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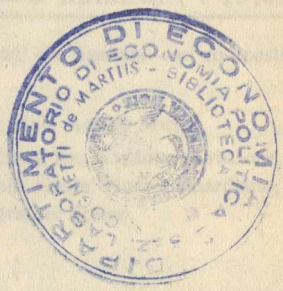
EVOLUZIONE DEI PREZZI DEI TITOLI GNMA: EVIDENZA EMPIRICA

L'obiettivo di questo lavoro consiste nel qualificare i risultati ottenuti nella letteratura empirica relativi ai possibili effetti dell'introduzione dei mercati futures sui prezzi a pronti degli strumenti finanziari corrispondenti.

La maggior parte dei lavori esistenti si basano sull'ipotesi di stazionarietà delle serie di dati opportunamente trasformate: tale ipotesi viene qui discussa utilizzando l'analisi spettrale. Questo metodo statistico permetterà di confermare i risultati precedenti oppure, nel caso di non stazionarità, di asserire che non è possibile trarre conclusioni ben precise sull'effetto dell'introduzione delle trattative in futures sui prezzi a pronti.

I risultati ottenuti sottolineano la struttura non-stazionaria della serie dei prezzi dei titoli GNMA (Government National Mortgage Association); in particolare la non stazionarietà è del tipo "uniformemente modulato", nel senso che la varianza della serie non è stazionaria nel tempo, mentre è stazionaria solo la sua distribuzione percentuale tra le frequenze. Ne deriva che occorre valutare con grande cautela i risultati relativi all'effetto dell'introduzione dei mercati futures, i quali evidenziano una variazione di regime. La conclusione che se ne trae è che eventuali modifiche del comportamento della serie vanno lette nel contesto del continuo fenomeno evolutivo della stessa.



RISULTATI DI BILANCIO 1990
101° ESERCIZIO

Domenica 14 aprile l'Assemblea Ordinaria dei Soci, riunita in prima convocazione, presso i locali di Villa Di Pasquale in Ragusa, ha approvato il Bilancio dell'esercizio 1990, di cui si riportano i dati piú significativi:

Fondi intermediati	**2.098** miliardi (+17,53%)
Raccolta da clientela	**1.430** miliardi (+13,04%)
Raccolta indiretta	**626** miliardi (+33,25%)
Impieghi a clientela	**645** miliardi (+29,39%)
Utile netto	**12** miliardi (+16,81%)
Patrimonio	**226** miliardi (+15,03%)

L'Assemblea, inoltre, ha ricostituito gli organi Sociali che risultano cosí composti:

Consiglio di Amministrazione:

Presidente: Dott. Mario Schininà - Vice Presidente: Avv. Angelo Micieli

Consiglieri: Dott. Giovanni Arezzo, Dott. Giovanni Cartia, Rag. Emanuele Criscione, Dott. Giovanni Demostene, Rag. Salvatore Digrandi, Comm. Geom. Nunzio Guardiano, Dott. Giorgio Polara, Rag. Francesco Pluchino, Rag. Salvatore Scarso.

Collegio Sindacale:

Presidente: Comm. Dott. Giorgio Bonomo

Sindaci effettivi: Sig. Armando Nicita, Dott. Rosario Ottaviano
Sindaci supplenti: Rag. Antonino Paolino, Dott. Lorenzo Pinzero

Comitato dei Probiviri:

Dott. Vito Curiale, Avv. Giuseppe Di Paola, Dott. Giovanni Giampiccolo

Il dividendo, L. 2.100 per azione, è in pagamento presso le Dipendenze della Banca dal 15 aprile 1991.

Banca Agricola Popolare di Ragusa

Sede Sociale e Direzione Centrale - RAGUSA - Via G. Matteotti, 84

BANCA POPOLARE DI VERONA

Il 20 aprile si è tenuta l'Assemblea dei soci della Banca Popolare di Verona, che ha approvato la Relazione del Consiglio di amministrazione e il Bilancio dell'

ESERCIZIO 1990

Mezzi amministrati	**8.096 miliardi**	**+13,34%**
Raccolta da clienti	**5.227 miliardi**	**+10,06%**
Raccolta indiretta	**6.261 miliardi**	**+25,85%**
Impieghi diretti sull'economia	**4.523 miliardi**	**+18,74%**
Impieghi indiretti	**601 miliardi**	**+14,04%**
Crediti di firma	**597 miliardi**	**+10,14%**
Portafoglio titoli di proprietà	**1.406 miliardi**	**+17,36%**
Patrimonio (capitale sociale, riserve e fondi disponibili)	**1.472 miliardi**	**+19,10%**
Utile operativo	**273 miliardi**	**+13,13%**
Utile netto	**113 miliardi**	**+11,56%**
Dividendo per azione	**L. 1.900**	

La Banca ha continuato l'estensione del piano di sviluppo territoriale con l'apertura di 17 nuovi sportelli, raggiungendo ad oggi un totale di 122.

Consiglio di amministrazione: *Presidente:* Giorgio Zanotto; *Vice Presidenti:* Aldo Marchi e Francesco Pasti; *Consiglieri:* Alberto Bauli, Giovanni Pietro Biasi, Giuseppe Danda, Ugo Della Bella, Enzo Erminero, Giuseppe Fedrigoni, Mario Fertonani, Giacomo Galtarossa, Leonardo Gemma Brenzoni, Giuseppe Nicolò, Ferdinando Peloso, Pietro Perissinotto, Luigi Andrea Poggi, Antonio Polin, Carlo Rizzardi.
Collegio sindacale: *Presidente:* Luigi Valotto; *Sindaci effettivi:* Giovanni Benciolini, Giorgio Maria Cambié, Giuseppe Randi, Giovanni Tantini; *Sindaci supplenti:* Stefano Dorio, Giuseppe Parolini.
Collegio dei probiviri: *Effettivi:* Leopoldo Conforti, Renato Gozzi, Carlo Vanzetti; *Supplenti:* Marco Cicogna, Sergio Mancini.
Direttore Generale: Federico Pepe.

BILANCIO 1990 DEL CREDITO FONDIARIO S.P.A. E DELLA SEZIONE AUTONOMA OPERE PUBBLICHE.

BILANCIO AL 31.12.1990		(in miliardi di lire)
Impieghi in mutui e anticipazioni	**6202,5**	**+ 18,2%**
Patrimonio netto e fondi rischi	**895,6**	**+ 16,9%**
Utile netto di esercizio	**58,5**	**+ 11,0%**

Si è tenuta a Roma, lunedì 22 aprile, l'Assemblea ordinaria degli Azionisti del Credito Fondiario S.p.A. FONSPA, che ha approvato i bilanci dell'Istituto e della Sezione Opere Pubbliche, chiusi al 31 dicembre 1990. Nello scorso esercizio l'Istituto, confermando il suo positivo sviluppo, ha erogato finanziamenti di credito fondiario ed edilizio per complessivi 1513,4 miliardi, con un incremento del 16,7% rispetto all'89. Dopo aver accantonato a riserve patrimoniali 38,5 miliardi, l'Assemblea ha deliberato di corrispondere un dividendo di 200 lire per azione, pagabile a partire dal 16 maggio 1991 su presentazione dei certificati azionari, ai sensi delle disposizioni di legge, presso le Casse incaricate: Banca Commerciale Italiana, Credito Italiano, Banco di Roma, Banca Creditwest e dei Comuni Vesuviani, Banca Nazionale dell'Agricoltura, Banca Nazionale del Lavoro, Banca Popolare di Milano, Banca Popolare di Novara, Banco Ambrosiano Veneto, Banco di Napoli, Banco di Sardegna, Banco di Santo Spirito (Gruppo Cassa di Risparmio di Roma), Banco di Sicilia, Cassa di Risparmio delle Provincie Lombarde, Credito Romagnolo, Istituto Bancario Italiano, Istituto Bancario San Paolo di Torino, Monte dei Paschi di Siena, Monte Titoli S.p.A. (per i titoli dalla stessa amministrati) e presso la sede sociale.

Gli organi sociali risultano così composti: Consiglio di amministrazione: Presidente Mario Piovano, Vice-presidente Oliviero Prunas; Consiglieri: Gaetano Cigala Fulgosi, Rosario Corso, Sergio de Nicolais, Orazio Flacchi, Alberto Geremia, Francesco Morabito, Francesco Picardi, Salvatore Quarzo, Antonio Staffa; Segretario: Antonello Delcroix; Collegio Sindacale: Presidente: Oddone Pinto; Sindaci effettivi: Giuseppe Armenise, Carlo Griffa; Sindaci supplenti: Marco Giustino, Pietro Gori.
Direttore Generale: Antonio Masala.

La Banca Commerciale Italiana, il Credito Italiano e il Banco di Roma partecipano al capitale sociale e rappresentano l'Istituto con tutte le loro filiali.

FONSPA CREDITO FONDIARIO SOCIETÀ PER AZIONI

SEDE IN ROMA: 00147 - VIA C. COLOMBO 80 - CAPITALE SOCIALE E FONDI PATRIMONIALI L. 875.597.544.701

ISTITUTO CENTRALE DELLE BANCHE POPOLARI ITALIANE

SOCIETÀ PER AZIONI

CAPITALE SOCIALE E RISERVE AL 31 DICEMBRE 1990: L. 215.401.065.825

Direzione Generale: MILANO - Corso Europa, 18

Ufficio di Roma e Sede Sociale: ROMA - Via Donizetti, 12/a - 14

Tribunale di Roma: Registro società n. 526/41 - Fascicolo 598/41
Anno di Fondazione: 1939

BILANCIO 1990 (lire miliardi)

ATTIVO		PASSIVO	
Corrispondenti debitori e fondi presso l'Istituto di Emissione	2.655,7	Corrispondenti creditori e assegni circolari	3.545,2
Titoli di proprietà	811,1	Fondi rischi, assistenza Banche popolari e accantonamenti	52,7
Partecipazioni	179,5	Ammortamenti	12,1
Crediti verso l'Erario	63,7	Voci diverse	31,5
Immobili	33,9	Capitale sociale e riserve	215,4
Mobili e impianti	4,9	Utile netto	6,2
Voci diverse	114,3		
	3.863,1		3.863,1
Conti impegni, rischi e d'ordine	68.916,0	Conti impegni, rischi e d'ordine	68.916,0
	72.779,1		72.779,1

Il 4 maggio 1991 ha avuto luogo in Roma, presso la sede sociale dell'Istituto, l'assemblea ordinaria degli Organismi associati (Banche Popolari ed Istituzioni della Categoria) che ha approvato il bilancio dell'esercizio 1990.

Dopo ammortamenti, accantonamenti ai fondi rischi ed assegnazione di L. 19 miliardi alla « Riserva disponibile », è stata deliberata la seguente ripartizione dell'utile netto di L. 6,2 miliardi:
– distribuzione di un dividendo di L. 125 alle n. 8.287.060 azioni da nominali L. 500 cadauna costituenti il capitale sociale;
– attribuzione alla « Riserva legale » di L. 4,5 miliardi, per aumentarla a L. 33 miliardi;
– ulteriori assegnazioni, ivi compresa la destinazione di una quota ad incremento del « Fondo assistenza Banche Popolari ».

Tra gli eventi più significativi dell'anno 1990 si è menzionato l'incremento della partecipazione al capitale dell'ISTITUTO ITALIANO DI CREDITO FONDIARIO, aumentata dal 26% al 40% circa; ciò ha assicurato alla Categoria, tenuto conto altresì della quota partecipativa del 18% a mani della consorella CENTROBANCA, il pieno controllo di questo importante Istituto, che opera sull'intero territorio nazionale per finanziare lo sviluppo dell'attività edilizia, delle opere pubbliche e della proprietà fondiaria.

Gli organi sociali dell'Istpopolbanche, dopo le nomine deliberate il 4 maggio 1991, risultano così composti:

CONSIGLIO DI AMMINISTRAZIONE

Presidente: Gr. Uff. Rag. Carlo Pavesi; Vice Presidenti: Dott. Italo Giorgio Bocci - Comm. Rag. Giovanbattista Fiorentini; Consiglieri: Gr. Uff. Dott. Rag. Vittorio Aulenti - Gr. Uff. Dott. Rag. Giuseppe Antonio Banfi - Dott. Cesare Caletti - Gr. Uff. Dott. Rag. Franco Carniglia - Comm. Dott. Giovanni Cartia - Comm. Dott. Antonio Ceola - Comm. Rag. Giovanni De Censi - Comm. Rag. Giandomenico Di Sante - Comm. Dott. Elio Faralli - Comm. Dott. Josef Froschmayr - Cav. Uff. Dott. Mario Giglio - Marchese Dott. Franco Lucifero - Cav. Prof. Dott. Renato Mastrostefano - Comm. Dott. Angelo Mazza - Cav. Gr. Cr. Rag. Guido Monzani - Gr. Uff. Dott. Vincenzo Mosca - Comm. Pietro Niada - Dott. Piermaria Pacchioni - Comm. Rag. Luciano Pastorello - Cav. Gr. Cr. Dott. Giuseppe Pedroni - Gr. Uff. Prof. Federico Pepe - Cav. Gr. Cr. Prof. Avv. Piero Schlesinger - Cav. del Lav. Gr. Cr. Rag. Lino Venini - Comm. Dott. Giuseppe Vigorelli. Segretario del Consiglio: Dott. Franco De Majo.

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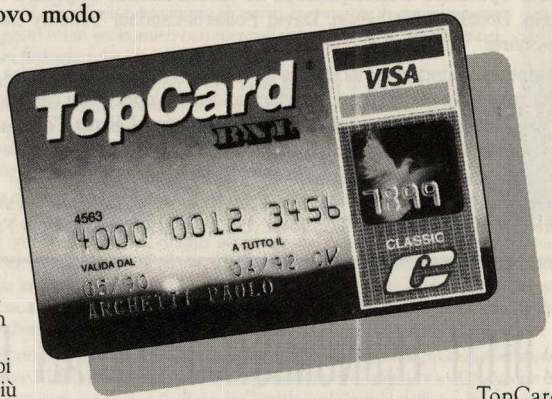

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Da allora con un continuo fiorire di iniziative essa ha contribuito, nelle diverse epoche, sia alla creazione della struttura economica italiana sia alla ripresa del commercio internazionale.

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Oltre ad offrire alla propria clientela una vasta gamma di servizi bancari e "parabancari", la Banca Commerciale Italiana garantisce anche una completa assistenza e consulenza nelle operazioni di import/export, nelle transazioni commerciali e finanziarie, nella gestione dei patrimoni mobiliari, nel factoring, nel leasing, nei fondi di investimento.

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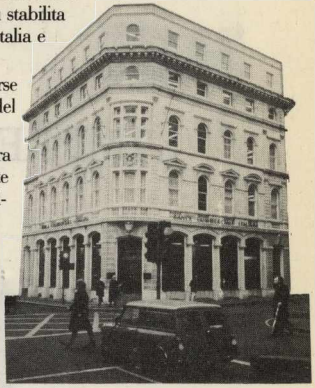

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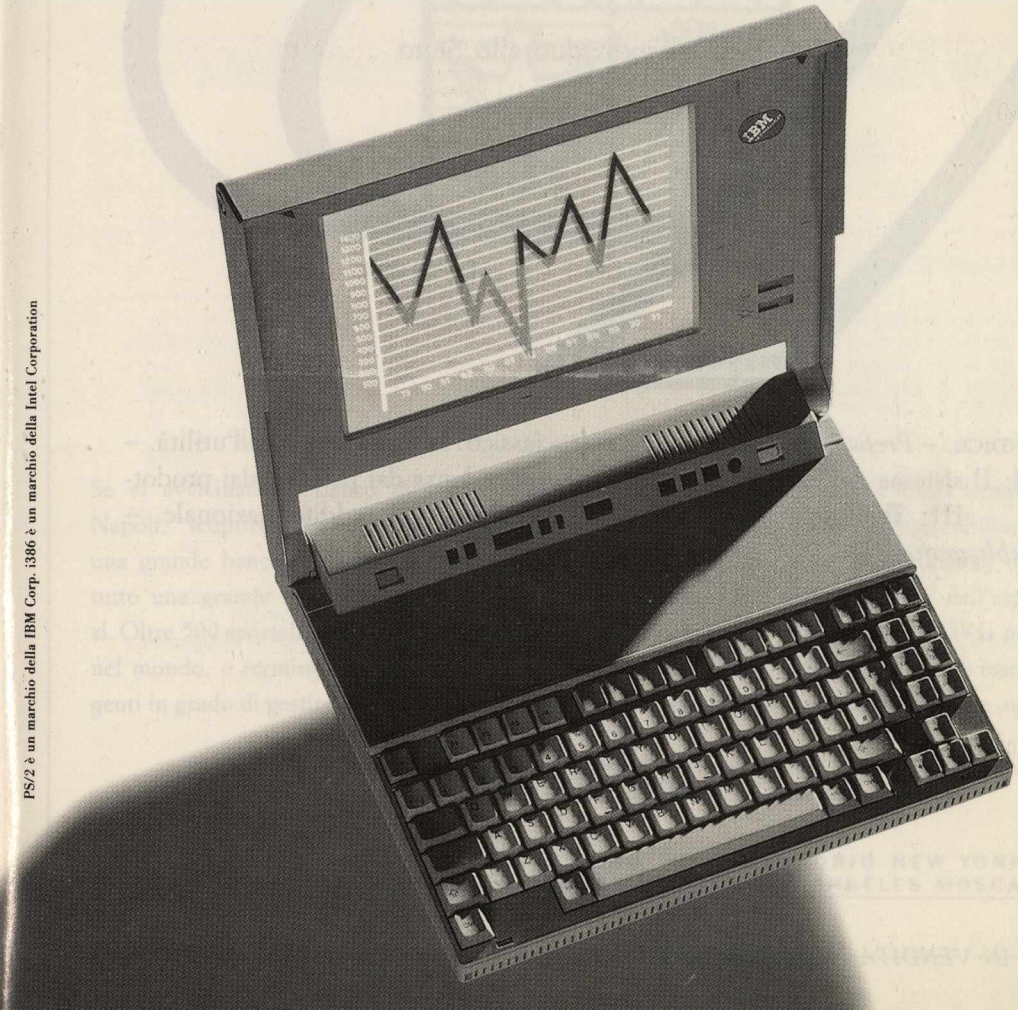

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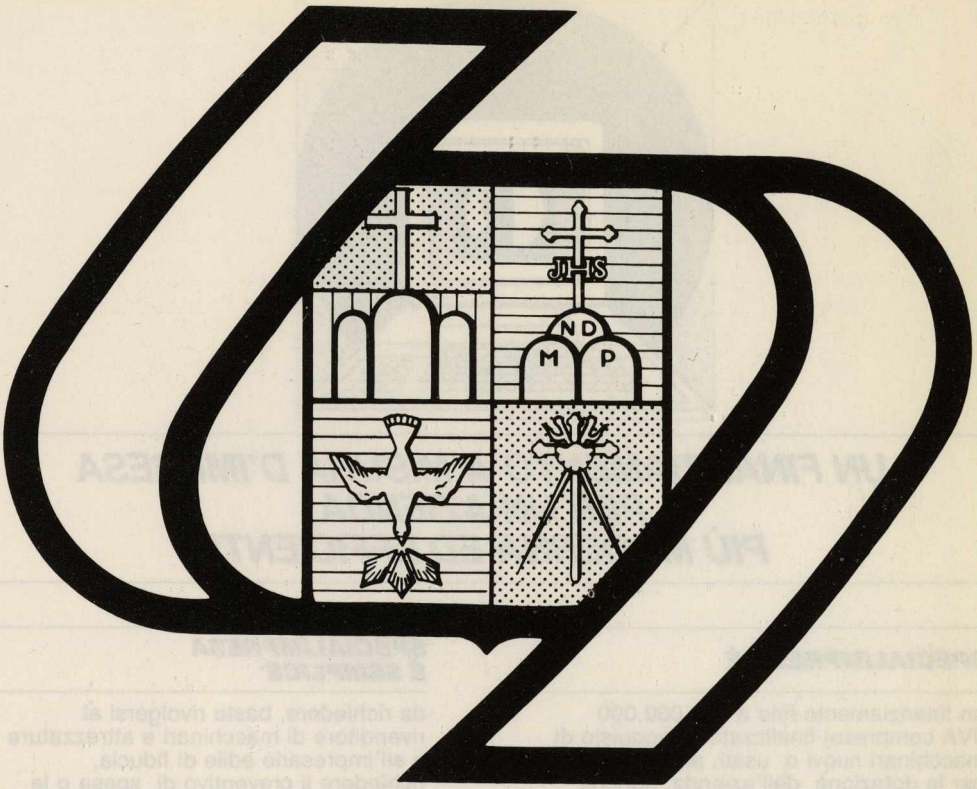
Al vostro fianco in Italia e nel mondo.

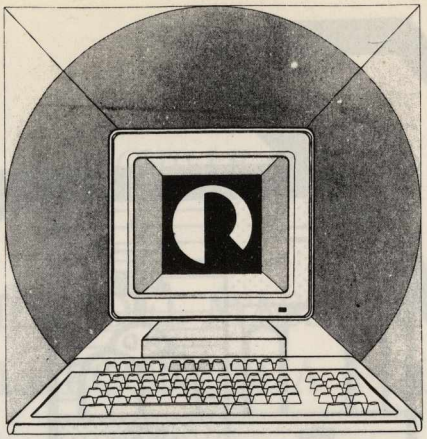


Se vi avvicinate al Banco di Napoli, scoprirete non solo una grande banca, ma soprattutto una grande rete di servizi. Oltre 500 sportelli in Italia e nel mondo, e terminali intelligenti in grado di gestire milioni di operazioni in tempo reale, ovunque voi siate. E ancora, una grande holding con società che operano in tutti i settori della finanza e dei servizi. E una presenza consolidata anche nell'area del credito a medio e lungo termine, a sostegno dell'agricoltura, dell'edilizia, dell'industria, delle opere pubbliche e dell'esportazione. Perché dal 1539 la nostra vocazione è quella di èsservi sempre vicini. In Italia e nel mondo.

BANCO di NAPOLI

BUENOS AIRES FRANCOFORTE HONG KONG LONDRA MADRID NEW YORK PARIGI
LUSSEMBURGO SOFIA BRUXELLES CAYMAN ISLANDS LOS ANGELES MOSCA ZURIGO

SPECIALIMPRESA



UN FINANZIAMENTO A MISURA D'IMPRESA PER UN'AZIENDA PIÙ MODERNA ED EFFICIENTE

SPECIALIMPRESA È

un finanziamento fino a 200.000.000 (IVA compresa) finalizzato all'acquisto di macchinari nuovi o usati, attrezzature per la dotazione dell'azienda, nonchè per la ristrutturazione o l'acquisto di locali adibiti ad uso aziendale.

SPECIALIMPRESA È PRATICO E CONVENIENTE

perchè è rimborsabile in comode rate mensili costanti posticipate, con durate, a scelta del cliente, di 18, 24, 36, 48 mesi.

SPECIALIMPRESA FINANZIA

l'impresa che vuol rimanere al passo coi tempi dotandosi delle necessarie strutture produttive.

SPECIALIMPRESA È SEMPLICE

da richiedere, basta rivolgersi al rivenditore di macchinari e attrezzature o all'impresario edile di fiducia, richiedere il preventivo di spesa o la fattura e recarsi ad uno degli sportelli della Cassa di Risparmio di Piacenza e Vigevano per chiedere il relativo finanziamento.

SPECIALIMPRESA È COMODO

perchè lo puoi trovare a due passi da casa, presso i **Rivenditori** e gli sportelli della **Cassa di Risparmio di Piacenza e Vigevano.**

CASSA DI RISPARMIO
DI PIACENZA E VIGEVANO

SPECIALIMPRESA